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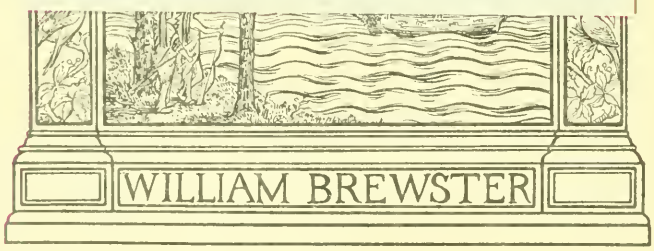

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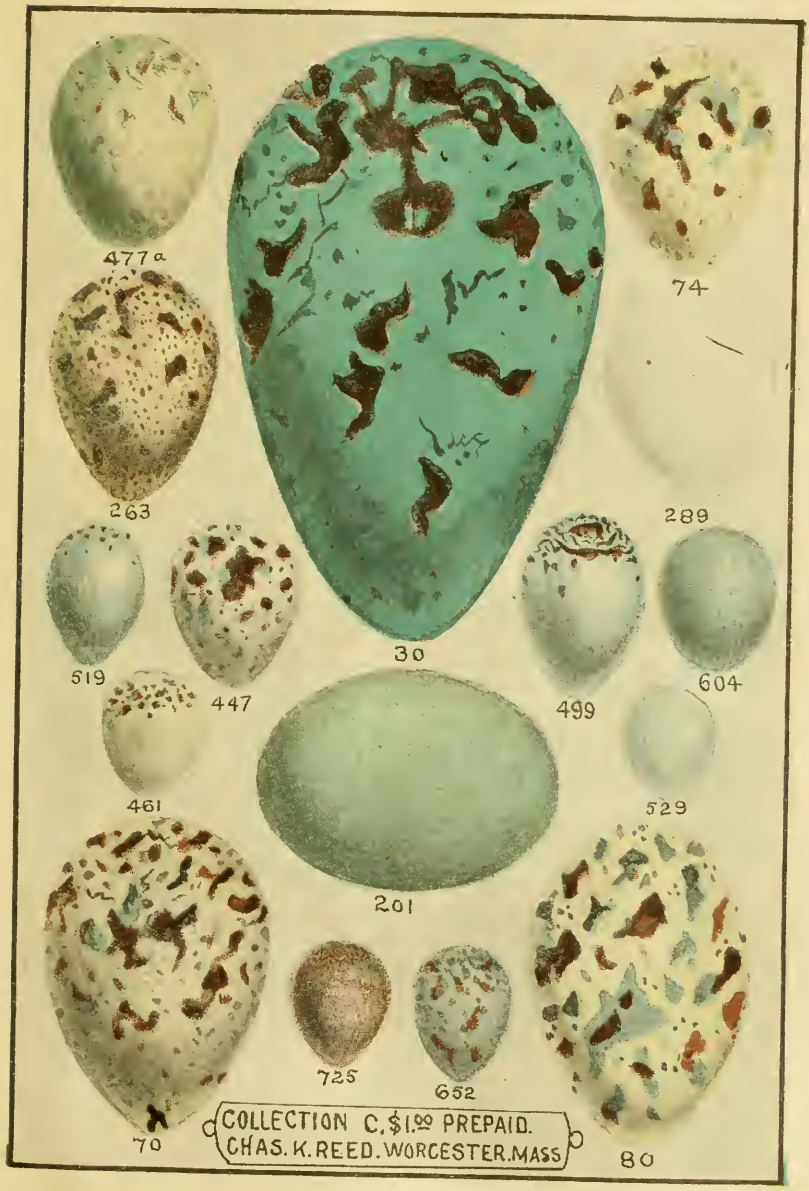

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THE MUSEUM.

A Monthly Magazine Devoted to Research in Natural Science.

VOL. IV. ALBION, N. Y., NOVEMBER 15, 1899 No. 1

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Walter F. Webb, Editor and Manager

Albion, N. Y.

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Notes.

Just five years have passed away since we sent out the first number of the MUSEUM. How time flies. It seems but yesterday that No. 1 was published and mailed and last month we sent out No. 60. We take this opportunity to thank our many patrons who have staid with us from the first and the many who have joined the ranks since.

We are well aware that the MUSEUM does not amount to much as compared with the big monthlies that give a volume of reading matter each month for 10c. or less by the year, but on the other hand, if you want to exchange with other collectors in some favorite line, or have something you wish to dispose of, or have noted some particularly interesting thing in your "walks and talks with Nature," there is no easier way to bring it before the collector public of this country than through the MUSEUM.

The price, 50 cents; seems a large one when compared with the journals furnished in other lines for this same figure, but with them you pay the price for a simple 12 numbers, while with us, if you are actively collecting and have duplicates to exchange, or if you are anxious to purchase specimens in any particular line, by availing yourself of the exchange coupons which we mail you free with each subscription you are able to dispose of all of your surplus material. Practically anything can be exchanged or sold through the MUSEUM. It has surprised me, time and again, to see how collectors have written in and told me of the success they have attained from a small notice. 25 to 50 letters are a common result, still some have sent notices that have brought no results and they were dissatisfied. The simple fact is they were offering something they did not want themselves and that no one else wanted.

This leads me to another line of thought, viz: A specimen or a lot of specimens that would not be available for your own cabinet is not likely to be available or satisfactory with others. Some collectors I have met seem to think that the specimens that are too poor for their own cabinet are fit only to exchange off to some other collector. I call this practically dishonest dealing, for it invariably causes dissatisfaction. On the other hand, I have correspondents who only send

me the choicest round bird skins, the nicest, clean, neatly drilled and well written data for birds eggs, fossils that are neatly cleaned and ready for the cabinet, shells that are always perfect in every way and cleaned ready for the draw, and so on. It is a real pleasure to deal with them, and to such collectors there is never any haggling about prices. I am always ready to send them anything I have in stock in any line and let them send me what they think is right. The fact, is they want everyone to have equally as nice specimens as they have, and are doing what they can to lift the standard of quality. Their work is a noble one and their names will live among collectors until the end of time.

The MUSEUM stands for a higher quality of work among collectors. If you are going to collect, do not take more than you can prepare and do well. It will be seven years next spring since we began the active handling of natural history specimens on a large scale. As a collector and exchanger of birds eggs we were known to a limited circle of collectors in that line for many years previous.

It would surprise you to learn the quality of specimens we have received from many so-called honest and well known collectors. The young collector who lives in the country away from a large city or other collectors, whose parents are against his collecting, and think it foolish and all that, we fully believe he is in a large measure excusable, for he has no books or means of learning what other collectors are doing or how they take care of their specimens. But I refer particularly to the collector who annually makes a practice of covering up any imperfection in an egg, skin or shell, so as to render it at first glance all right, and then deliberately sends it out without mentioning its imperfections in advance. Many times we have received eggs with faint cracks carefully concealed by dirt, a ragged hole covered by court plaster, a mutilated bird skin with the imperfection carefully covered with feathers, and smoothed down, and packed in cotton, thereby hoping the imperfection will escape notice until some time afterward. Again we have received beautifully made skins from collectors of their own take, where actually the bodies had simply been taken out and no work had been done on the inside. Of course in a few weeks or months the specimen was worthless.

For a long time we have thought seriously of mentioning these things through the columns of the MUSEUM, and calling attention to this fact, that well to-do collectors and those who take pains with their specimens sooner or later will draw off, so to speak, by themselves and have no correspondence with a man until he proves that he can prepare specimens well. It has in a large measure come to that now. Often collectors visit me and in the course of conversation I have repeatedly given them the names of correspondents of mine who prepare their material with care, and whose collections are a model of beauty. Lest someone takes offense, let me add it is not always the well-to-do that have the choicest collections as to quality They can very naturally afford the rareties, but often the poorest and most humble of our patrons send us some of the choicest prepared specimens.

We shall always be pleased to hear from collectors on any topic that interests them. In commencing another five year period, we assure collectors this is their journal as much as ours and we want them to always feel free to use its columns, that the fraternity may become better acquainted, exchange views and thoughts more liberally, that good may result.

Ancient Cliff Dwellers' City Just Explored.

The Rev. Dr. George L. Cole, of Los Angeles, who has just returned from a careful exploration of the ancient cliff dwellings of the Southwest,

has been so fortunate as to make some valuable additions to the little that is known about the cliff men and their ways.

During the summer Dr. Cole and his party visited cliff cities whose walled gateways had been seen before only by wandering miners or cattlemen. Never before had any white man climbed the thousand-foot precipice on which stands the largest of all the cliff dwellers' habitations yet known in the United States, save only the prospector who had discovered it three years before, and who served as the Cole party's guide. This ruin, fourteen miles from Espanola, N. M., is as yet without a name, but it promises to become famous when explored.

The Cliff Dweller wished his home to be inaccessible. He burrowed a dwelling in the face of a precipice or built a communial house on some mesa attainable only by closely guarded paths. The American cliff dwellings are not easy to find. It takes a keen eye to pick out the cave openings. Often a bunch of shrubs has rooted on the bench or the detritus from the cliff has masked the entrance. Harder still is it to find the ruins above the cliffs. The mesa summits are out of view from the valley and sheltered from sight of neighboring heights.

During Dr. Cole's expedition—the fourth which he has made for study of aboriginal antiquities—he spent some time among the cliff ruins of the Mancos, in Southeastern Colorado.

Many years ago the Wetherel family established itself near Mancos, Col., in the cattle business. One day the Wetherel vaqueros wandered over a mesa in search of mavericks—unbranded stray cattle, which belong to the man who picks them up. They came by accident upon a height from which they could see masonry walls. They clambered down and found the first of the Mancos cliff dwellings. Further search revealed the existence of village upon village along the cliffs.

The news of the discovery spread, and it was apparent that vandals would carry away everything of interest and tear down all the walls in search of buried relics. So the Wetherels took visitors only to the cliff dwellings nearest the house. If they were persistent it was admitted that there was another ruin. This second cliff village was enough to satisfy the most ardent sightseer and the remaining cliff dwellings were left undisturbed.

The "Cliff Palace" is strangest of the Mancos habitations. To reach it one must have sinew and grit and a steady head. One may stand in the canyon bottom, seven hundred feet below, and look up at the bench on which the ruins stand, but only balloons or kites would make the direct ascent possible. To reach the balcony one must descend several hundred feet from the mesa above it. So there must be a detour of fifteen miles up the canyou to a practicable bit of wall, and then back along the mesa until the "Cliff Palace" can again be seen.

When the attempt to descend begins realization comes of the wisdom with which the Cliff Dwellers chose their home. Only by a single difficult trail can the "Cliff Palace" be approached. At last the crumbling walls are in sight. A smooth rock surface, tilted at an angle of 75 degrees, must be passed. Once there were deep finger and toe holes, but wind and rain erosion have worn the edges, and it is no easy matter to cling to the insufficient foothold. For a hundred feet this is the highway.

Keep your face to the cliff; don't look down, else the knowledge that 800 feet of almost sheer declivity lies below may unsettle your nerves. Creep cautiously along, working on from hole to hole; cling to the finger holes until your nails are worn—and now at last the platform is reached.

The photographer of the party, Fay C. Cole, made the climb down the cliff, carrying a heavy camera. Three times Dr. Cole himself started on the

descent, twice he was unable to go on. No doubt the ancient inhabitants thought nothing of that hair-raising descent.

Once attained, the bench on which the palace stood, was found of no great extent. The precipice dropped away so suddenly that it seemed one could throw a stone into the canyon bottom, 700 feet below. No trace was found of any means of exit from the platform except the path.

It is surmised by Dr. Cole, however that the natives had ladders of yucca rope by which, in emergergency, they could descend to the valley.

The "Cliff Palace." It is most impressive, standing in lonely state on the high cliff bench in the shadow of the arched rocks. A a tall watch-tower stands near the entrance pathway, and behind is a tangle of unroofed buildings, the walls still massive.

Behind the walls are chambers hewn from the rock. On a higher level are visible the earlier cliff dwellings—mere burrows in the precipice. All food had to be carried from the mesa above or the valley below.

Dr. Cole made a curious find, which strengthens the theory that the Cliff Dwellers were a distinct race.

In excavating at the newly discovered ruins near Espanola he uncovered skeletons buried in a sitting posture with face to the rising sun. Every skull had a complete set of double teeth. There was not a single incisor to be found. At first he thought that the teeth might have been worn by eating hard food, but skulls of individuals of both sexes and different ages all showed the same peculiarity.

The skulls were shown to anatomists. They knew of no existing race which shows the peculiarity. The front double teeth were shown to be different from the incisors of ordinary men, and characteristically molar. The explanation was that these skulls had belonged to a race of grain-eaters.

The story of the finding of the skeletons is curious. Three years ago a prospector stumbled upon the cliff dwellings. His curiosity aroused, he scaled the canyon wall, and found himself on a tableland a mile and a half long by three-quarters of a mile wide. At its edge stood a granite watchtower. Back a little way rose a mound scarcely more than fifteen feet high in any place, with broken walls. It was the ruins of an aboriginal city, a vast communal dwelling, measuring 240x300 feet, which must have contained 1600 rooms, and perhaps 2000. Between five and six thousand people may have dwelt in the building. Further back stood the ruins of a still older pueblo.

The prospector went away and almost forgot his adventure. To a few acquaintances he spoke of his discovery, and the story came to the ears of the antiquarians.

For three years they hunted for the prospector, but he had dropped out of sight. Prof. Hodge talked with him, but never guessed who he was, and probably doesn't know what he overlooked. Dr. Cole was more fortunate. He found the prospector and secured his guidance to the ruined city.

The climb was difficult. A thousand feet had to be surmounted. Many cliff caves were passed on the way. The summit gained, the party found themselves close beside the watch tower. It was all of granite blocks. The nearest granite deposits are at a considerable distance, and every block must have been carried with incredible labor across the valley and up the face of the cliff.

The great pueblo came next. Dr. Cole reached the conclusion that the stone walls rose two stories and were surmounted by a story of adobe. In the centre was a court, a common kitchen. From the court radiated an immense number of rooms twelve deep and in three tiers. They averaged fourteen feet square. It is believed that, as in the modern pueblos entrance was gained only by climbing on ladders to the roof. Entrance to the

rooms could be gained only by digging.

Ancient pottery, carved stone implements, bones, a stone pipe whose carvings differ from anything ever before seen, were unearthed. Dr. Cole estimated that it would cost about $45,000 to excavate the ruin and collect all the information which it could throw on the life of the Cliff Dwellers.

A hint of why the city was abandoned is found in the fact that the mound is largely of volcanic ash. Dr. Cole believes that centuries ago there was an outpouring of internal fires. Terrified by the shaking of the rock platform, half suffocated by smoke and sulphur fumes, the Cliff Dwellers fled, never to return. The earthquakes topled down the walls, the volcanic ash buried them deep, and through all the ages since the dead city has awaited the coming of a civilized race.

The picture-writing tells more. In some such a bit of these ancient characters as shown in a photograph of the pictorial rocks of the Verde River, Arizona, one may see the concentric circles which represent the sun, the quivering lines which mean lightning, the zigzags of the clouds, the vertical lines which record rain, the figure of the sacred turkey, the crude representation of a human figure, and innumerable symbols in which is written the history of evil days and happy, prosperous years and seasons of famine, the deeds and deaths of chieftains, and praise of the Most Holy, the Lord God Sun, whose life-giving radiance typified for the Cliff Dwellers all that was most sacred.

Notes on American Land Shells.

The collecting of our American Land shells is worthy of your attention. In order that collectors may have a better idea of the great interest attached to the study of our American Mollusca, I shall quote some from Binney's manual of the Land Shells of the United States. Under "Habits and Properties" he says:

"The snails live mostly in the forests, sheltered under the trunk of fallen trees, layers of decaying leaves, stones, or in the soil itself. In these situations they pass the greater part of their lives. In the early days of Spring they sometimes assemble in considerable numbers, in warm and sunny situations, where they pass hours in indolent enjoyment of the warmth and animating influence of the sunshine. Whether these meetings serve any useful purpose in the econemy of the animal, or are caused by the pleasurable sensation and renewed strength from the warmth of the situation after the debility of their winters torpidity, is uncertain; it is probable, however, that they they precede the business of procreation. It is certain that they last but a short time, and that after the early Spring, the animals are to be found in their usual retreats.

In the course of the months of May or June, earlier or later according to the locality and as the season is more or less warm, they begin to lay their eggs. (a few species are viviparous) These are deposited, to the number of from thirty to fifty and even more, in the moist and light mould, sheltered from the suns rays by leaves, or at the side of logs and stones, without any order, and slightly agglutinated together. The depth of the deposit is usually measured by the extreme length of the animal. which thrusts its head and body into the soil to the utmost extent, while the shell remains at the surface; but sometimes the animal burrows three or four inches deep before making the deposit, in order to insure a sufficent moist position. Three or four such deposits, and sometimes more, are made by one animal, during the summer and autumn. When the deposit is complete it is abandoned by the animal. The eggs vary in size according to the magnitude of the species producing them. They are nearly globular, one axis being somewhat longer than the other, white and opaque. They consist in general, of

an external, semicareous, elastic membrane, investing the whole, the interior surface which is usually studded with numerous rhombic, microscopic crystals of carbonate of lime, some species however, have a hard enveloping calcarous shell, of the consistence of that of birds egg; of an inner thin, transparent and somewhat vicid fluid-analogus to the albumen of bird's eggs; of the albumen itself and of the vitellus, which; posessing the same degree of transparency as the albumen, cannot be distinguished from it at this time. The elastic eggs when first laid, are often flascid, and seemingly only half full of fluid, but they soon absorb moisture and become distended. The embryo animal with its shell, is observable in the albuminous fluid in a few days after the egg is laid. It hatches, under ordinary circumstanes, in from 20 to 30 days according to the state of the atmosphere. Warmth and humidity hasten the process, while cold and dryness retard it to an almost indefinite extent. The hatching of eggs laid late in autumn is often interrupted by the approach of cold weather and of snow, and delayed until the next Spring.

The young animal gnaws its way out of the egg, and makes its first repast of the shell it has just left. It consists at first of about one and a half whorls, the umbilicus being minute but open. Its growth is rapid, and it has usually increased in magnitude three or four times by the end the first year.

In the month of October, or at the epoch of the first frost, the snail ceases to feed, becomes inactive, and fixes itself to the under surface of the substance by which it is sheltered, or partially burrows in the soil, and with the aperature of the shell upwards, disposes itself for its usual sleep or hibernation. Withdrawing itself into the shell, it forms over the aperture a membranous covering, consisting of a thin semi- transparent mixture of lime, mucus or gelatine, secreted from the collar of the animal. This membrane is called the epiphragm. It is formed in this manner: the animal being withdrawn into the shell, the collar is brought to a level with the aperture, and a quantity of mucous is poured out from it and covers it. A small quantity of air is then emitted from the respiratory foramen, which detaches the mucous from the surface of the collar, and projects it in a convex form, like a bubble. At the same moment, the animal retreats further into the shell, leaving a vacuum between itself and the membrane, which is consequently pressed back by the external air to a level with the aperature, or even farther, so as to form a concave surface, where, having become desiccated and hard, it remains fixed. These operations are nearly similtaneous, and occupy but an instant. As the weather becomes colder, the animal retires further within the shell, and makes another septum, and so on, until their are sometimes as many as six of these partitions. The circulation becomes slow, the pulsations of the heart, which in the season of activity vary from 40 to 60 in a minute, according to the temperature of the air, decrease in frequency and strength until they at length become imperceptable. The other functions of the body cease, and a state of torpidity succeeds which is interrupted only by the reviving heat of the next Spring's sun. During the months of April and May or on the accession of the first warm weather of the season, the animal breaks down and devours the membraneous partitions and comes forth to participate in the warmth and freshness of the season. At first is is weak and inactive, but recovering in a short time its appetite, resumes its former activity."

We will next month give a further chapter on these most interesting animals. They are to be found in all parts of the U. S. and in some sections but little is known of the present fauna. Good results and many new species will doubtless be discovered and we

hope the series of articles we shall present, will be the means of their more extended study.

Barnacles.

"If you wish to see these little fishermen casting their nets," says Margaret W. Leighton in *Popular Science*, "go to a rocky tide-pool. or to the piles that support some old wharf, and there search for clusters of white cone-shaped shells, from a quarter to a half inch in height. As the tide flows over them, watch carefully and you will see an exquisite little fan of daintily curled feathers slowly emerging from the top of a cone. Soon others will appear, and before long the feather fan will all be curling and uncurling. They seem to be scooping up the water and letting it run through the fine meshes of the nets, for such really are the little fans, which are sometimes called 'glass hands.'

"The group in which the barnacles belong is named, from this peculiarity, Cirripedia (curled feet). The life history of this barnacle is very wonderful. It belongs to the great class Crustacea and is cousin to the crabs, shrimps and crayfish, although at the first glance it does not seem to resemble them in any particular. If we spend considerable time in watching the barnacles we may be fortunate enough to see one throw out a cloud which thickens the water. If we examine a bit of this under the microscope we see it is composed of myriads of living creatures, all moving as fast as possible, flopping their legs and jerking themselves about. Each has a shield-shaped covering for its body, which ends in a long, slender tail. It has six legs fringed on one edge, which it uses for swimming. It it were placed upon the ground it could not take a step, even with its six legs, for they are absolutely useless out of water. It has one large black eye and on its forehead grows a pair of crooked horns. In this stage it looks very much like a young crab or shrimp.

"It spends its time swimming about with a jerking motion. After passing through several changes, it appears with a shell similar to that of the clam. Its one eye has now divided into two, aud each is affixed to the end of a little stalk. Nature, thinking perhaps that six legs were not enough, now bestows upon the baby barnacle another pair. It soon tires of this stage of its existence, and decides that it is time to fix upon a permanent spot for its home. It generally decides upon a rock, the bottom of a ship, the skin of a shark or the piles beneath a wharf.

"As soon as it has made its choice, the barnacle fixes itself firmly to its home by a kind of glue which it has secreted in glands at the base of its antennæ. When its head has become securely glued to the rock or wood it changes its skin for the last time, casting off with it the shell and the eyes on the stalks. Its swimming legs have become transformed into the fishing net. In the first stage the barnacle had a shelly covering in one piece; after a time it donned a shell with two halves like the clam's, and in this last stage its shell is composed of many pieces. It now lives in a beautiful little white castle built of stony plates, leaning towards each other. Just inside the top of the castle there are two of these plates which fit together and form a compact roof. The enemy who storms this fort will have a long seige before he gains an entrance.

"It is from between the plates at the top of the cone that the fishing net is thrust forth, and all the time that the tide is high it is busy scooping up water, from which it strains out the tiny animals for food. The net is composed of twenty-four delicately curled filaments surrounding the mouth (many-jointed and covered with hairs which are organs of touch). When a tiny living creature comes in contact with these sensitive hairs they immediately close tightly over it and carry it towards the mouth, which thrusts itself out to meet the coming dainty.

The barnacle has three pairs of jaws. The two outer pairs are horny and toothed, while the inner one is soft and has no teeth.

"When the tide is out, all the castles of the barnacles are tightly closed, but, as soon as it comes in, the rocks on which they live seem to be alive, so busily do they all work at their fishing, which they continue as long as the water covers them.

"Barnacles have varying tastes which they display in the selection of their homes. The acorn barnacles encrust piles and rocks. One kind makes for itself a cosy burrow, by means of the horny spines which grow upon it. One species is parasitical on sharks, and still other kinds live on turtles, sunfish and blackfish. One of the commonest is the ship barnacle, which grows very rapidly. Sometimes a vessel leaves port without a single barnacle on her hull. She makes but a short voyage, but on returning to her starting point it is found that whole colonies of barnacles have fastened themselves to the outside of her hull. This species developes a long stalk so that it sometimes hangs down sixteen inches in the water

"There is a curious old myth connected with the ship barnacle, or as it is sometimes called, the goose barnacle. Two hundred and fifty years ago many people believed that a little goose was hatched from this barnacle. As these geese were produeed by a fish, it was allowable to eat them on days when meat was prohibited by the church. Gerard, in the appendix to his History of Plants, written in 1633, announces that, having arrived at the end of his history, he thinks it 'not impertinent to the conclusion of the same to end with one of the marvels of this land (we may say of the world).' He says that in the north parts of Scotland are 'certaine trees whereon doe grow certaine shell fishes of white color tending to russet, wherein are contained little living creatures, which shells in time of maturitie doe open and out of them come those little living fowles whom we call barnacles.'"

Collecting Fresh-Water Shells. *

The study of the Mollusca, or Conchology as it is popularly called, is one of the most fascinating pursuits known to the naturalist. These lowly creatures are easy to collect and their shells may be preserved with little or no trouble, and a collection of them is not only an object of interest to the student, but is of interest to those not engaged in the study, on account of its beauty. In the present article the writer has attempted to explain the best methods of collecting and preserving the fresh-water forms in this branch of zoology.

The collecting outfit is quite simple, but efficient; an ordinary fish-basket makes one of the best collecting receptacles, in which may be carried several tin mustard boxes or two-ounce bottles with wide mouths and a large, oblong market-basket will be found invaluable to carry the bulkier kind, like Unio. A dip net, made like a butterfly net, only much stouter, will be of great use in dredging in the soft mud for small bivalves like Sphærium. Several small homœpathic vials will be found useful to put the smaller species in, but the cork should be attached to the bottle by a string so it will not be lost. A flat-bladed knife or small trowel and a pair of small tweezers, the points of which should meet evenly, will complete the collecting outfit. A scoop made of fine wire gauze will make a useful dredge with which to scoop the mud out of shallow ponds and rivers.

A small dredge, similar to those used in deep sea dredging is of great value in collecting in the larger lakes and rivers. A strong man, or better, two men should row the boat and the one having charge of the dredge should be ever on the alert for obstructions on the bottom so that the dredge may

* Frank C. Baker in Popular Science, published at 118 Fulton St., New York.

not be damaged. A lead should be prepared with a hollow base in which to place some kind of grease to ascertain the character of the bottom, whether sandy or muddy, and should be attached to a stout line marked off in feet, to record the depth. These points should always be carefully noted with each haul, together with the distance from the shore.

Fresh-water shells may be found almost everywhere; in ponds, ditches, creeks, rivers and lakes. Any region having a good water supply will support a fresh-water molluscan fauna. There are some bodies of water, however, which are unsuited to molluscan life. When the bottom is made up of coarse crystalline gravel few mollusks will be found, but when there is a large quantity of lime held in solution in the water and when the bottom of the stream or pond is muddy, the chances are that a careful search will result in the discovery of a numerous and varied molluscan fauna.

A rapid current is less favorable than stller water, although a few mollusks (as the fresh-water melanians, Pleurocera, Goniobasis, etc.) are found in streams; on rocks over which a rapid current is flowing. When a stream or pond has become more or less filled with decaying vegetation, the mollusks generally die off on account of the presence of carbonic acid (carbon dioxide, CO_2) arising from their decay. It is useless to expect to find many mollusks under such conditions. This not only affects the life of the animal, but causes an excessive erosion of the shell, in the repair of which the animal is weakened by the enforced secretion of shelly matter.

Those mollusks breathing by means of gills will not voluntarialy inhabit a body of water holding impalpable mud in suspension, nor will they exist to any extent in streams charged with any kinds of salts. Many times. however, some hardy species survive in even brackish water; the effect of such a habitat is to dwarf and otherwise distort the shell. Some salt water species are known to inhabit both brackish and fresh water.

The small bivalves, Pisidium and Sphærinm, prefer mountain pools, wet meadow ponds and ditches. Anodonta prefers large ponds and slow moving streams, while the stouter Unio lives best on a hard, rocky bottom; in sandy bottoms they may be seen pushing themselves about quite rapidly. In ponds and sluggish streams the genera Physa, Limnæa, Planorbis and Amnicola are found abundantly. Lily pads are good habitats for small mollusks, as are also the roots of trees and blades of swamp grass.

Besides the locations mentioned above, the burrows of muskrats are always good localities for Unios and the shells may be found here perfectly cleaned. The drift along the shore will always be found to yield a large number of perfect specimens. It is frequently desirable to preserve a number of the shells of small bivalves alive for study, and for this a medium-sized fish globe is very useful. It will be of great interest to the student to study the living animal and record his observations. Much is still unknown concerning the habits of many of our common fresh-water mollusks and almost any student may add considerable information which will be of great value.

The preservation of the collections obtained on each day's trip is of great importance, for upon this depends the appearance and value of the collector's cabinet. When the specimens are collected they are covered with mud and growths of various kinds, and must be thoroughly cleaned. In the case of fresh-water shells, they should first be washed clean of mud, etc.; this may be removed easier by the aid of a tooth-brush. The soft parts may be removed by putting the animal for a few seconds in boiling water. If they are first placed in lukewarm water for a few minutes and then tran -

ferred to the boiling water it will prevent cracking and preserve the polish which is frequently lost when delicate shells are immediately placed in boiling water. The animal may then be extracted from the shell with a crooked pin or wire, or better still, a small pair of tweezers. Those species having an operculum should have it carefully removed and attached to a piece of cotton, which may be placed in the aperture of the shell. Some opercula warp out of shape while drying, and it will be found a good rule to place them between two boards during this process. Some of the shells may be covered with incrustations of lime and peroxide of iron, and to remove these an old file or small bone scraper will be found useful. The file should be ground to a point. Shells that are stained with iron or other matter may be perfectly cleaned by placing for a few moments in a solution of oxalic acid.

Unios and other bivalves should have the animal removed with a flat-bladed knife. To do this the two adductor muscles must be cut, after which the halves will open and the animal may be entirely cut away. If the shells are left in the sun for a few hours they will gape and the animal may then be easily removed. The two halves should be tied together in their natural position. Care should be used in cleaning the shell so that the hinge ligaments will not be injured. In the case of shells having an epidermis, they may be oiled with vaseline to prevent cracking when dry. Care should be used not to apply it in too large quantities or the shells will feel greasy. After applying the vaseline it should be thoroughly rubbed in with a flannel rag aad all surplus grease removed. Small gastropods need not be removed from the shell, but may be put in alcohol for 15 or 20 minutes, after which they may be dried and put in the cabinet. The collector will undoubtedly find numerous ways of improving his cleaning and preserving methods, as experience dictates.

The methods of labeling need not be dwelt upon here. All manner of schemes are used by conchologists in mounting and preparing specimens for the cabinet. Some use cardboard labels with a space for the specimens and another for the name, etc., others simply use cardboard trays, allowing the shells to remain loose instead of attaching them as in the case of the cardboard tablets. In the collections of The Chicago Academy of Sciences all specimens are attached to these tablets and they present a handsome appearance; but this is hardly feasible for the cabinet of a private collector, for lack of room. A good cabinet of drawers three inches in depth will suffice for most of the land and fresh-water shells, although several deeper drawers may be found useful for large Unios. In writing the labels the generic and specific names and the authority for the name should occupy the first line, and the locality and name of the person from whom the specimens were received may occupy the balance of the label; the bottom of the latter might be used to advantage for short notes relating to the habits or peculiarities of the individuals in the tray.

It is always a good idea to keep a catalogue of the collection. Each tray of specimens should be numbered and entered in the catalogue, together with all possible information. A card catalogue is also of great value.

Curator Chicago Academy of Sciences.

Popular Science.

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THE MUSEUM.

A Monthly Magazine Devoted to Research in Natural Science.

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THE MUSEUM.

A Monthly Magazine devoted to Ornithology, Oology, Mollusca, Echinodermata, Mineralogy and Allied Sciences.

Walter F. Webb, Editor and Manager

Albion, N. Y.

Correspondence and items of interest on above topics, as well as notes on the various Museums of the World—views from same, discoveries relative to the handling and keeping of Natural History material, descriptive habits of various species, are solicited from all.

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Notes on American Land Shells.

(Continued from November number.)

The season of hibernation continues from four to six months. The final cause of this extraordinary condition is undoubtedly to enable the animal to resist successfully the extreme reduction of temperature and to survive through a long period when it must, in northern climates at least, be entirely destitute of food. With a view to the first purpose, a place of shelter is provided, and the aperture of the shell is hermetically sealed by the epiphragm or the hibernaculum; for the second, the state of torpor is adopted, during which the functions of digestion, respiration and circulation being suspended, and all the secretions and excretions having ceased there is no drain upon the strength and vitality of the animal, and no exhaustion of its forces. Hence it comes forth at the end of the period, in much the same condition in which it commenced it, and resumes almost immediately its usual functions and habits. So entire is the cessation of the function of respiration that the air contained within the epiphragm and the animal is found unchanged. The circulation, however, may be partially restored by a small degree of heat, the warmth of the hand being sufficient to stimulate the heart to action.

In the portions of the country subject to long periods of drought, the same process is resorted to as a defense against want of moisture. In this case the epiphragm is much thicker. In the genus *Binneyi*, it is still more developed, in order to protect the parts of the animal incapable of being drawn within the shell.

The snails pass the greater part of their lives under dead leaves and logs, under stones or burrowing in the ground. They seldom come from their lurking places while the sun shines, and indeed are never seen ranging in the day time unless the day be dark and damp. Should they then be surprised by the appearance of the sun they immediately take shelter from its rays under some cover or on the shaded sides of trunks of trees.

Their natural food is vegetable, and the formation of the mouth and the organs with which it is armed, seems to be peculiarly well adapted for cutting fruits and the succulent leaves of plants. The cutting-edge of the jaw being applied against the substance to

be eaten, the semi-lunar rough instrument, usually called the "lingual membrane," is brought up against it, cutting out and carrying into the mouth semi-circular portions of nutriment. The operation is carried on with great rapidity, and the substance to be eaten soon disappears. It is certain, however, that some species are fond of animal food, and sometimes prey upon earth-worms, their own eggs, and even upon each other; but the slowness of their motions and their consequent inability to pursue prey, forbids the idea of their being dependent upon animal food. They, in their turn, become the prey of various birds and reptiles; and it is no uncommon thing to observe, in the forest, clusters of broken shells lying upon logs or stones, which have been chosen by birds as convenient places for breaking the shell and extracting the animal.

The snails of the United States are for the most part solitary in their habits, differing very much, in this respect, from the snails of Europe. It is true that in localities favorable for their residence they may be collected in considerable numbers; and especially is this the case in the states north of the Ohio River. But even there they seem to live independently of each other, and not to unite into herds and communities. There are occasional exceptions, however, as in the case of *Pyramidula alternata*, very large numbers of which have been observed collected into a small space, especially in winter, as if for the purpose of imparting warmth to each other. The few species of European snails which have been introduced retain their native habits. *Helix hortensis*, for instance, which has been transplanted to some of the small islands in the vicinity of Cape Ann, is found there in countless numbers, literally covering the soil and shrubs. It is worthy of notice also that each island is inhabited by a variety peculiar to itself, showing that the variety that happened to be introduced there has propogated itself without a tendency to run into other variations. Thus, on one islet is found the yellowish green unicolored variety, once described as *Helix subglobosa*; and on another, within a very short distance, we find a banded variety and none others.

In regard to colors our snails are quite plain and exceedingly uniform; in this respect also differing essentially from the species of the old world. They vary from yellowish-green, through horn color to chestnut, most of them being simply horn colored. This is perhaps owing to the fact that our species do not infest our gardens and open fields, but are generally confined to forests, sheltered under logs and stones, and are rarely seen abroad except during twilight or on damp and dark days; indeed, they almost entirely disappear as the forests are cut down and seem to flee the approach of man. The European species, on the other hand, follow in the track of cultivation, and are common in gardens and fields, on walls and hedges, and other places exposed to the action of light. With the exception of Pyramidula alternata, Hemitrochus varians, Lignus fasciatus, etc., there is scarcely a species having bands or variegated colors inhabiting eastern North America; and even there these latter species can scarcely be regarded as an exception, as they are only to be found in the southern part of Florida, and are more properly West Indian shells. In Texas and beyond the Rocky Mountains in Oregon and California, many of the species have one or more bands.

Another peculiarity of the American snails, is the tooth-like appendages with which the aperture of a large proportion of them is armed, and which are characteristic of the group designated by Ferussac under the name of Helicodonta. More than one-half of the whole number, and more than three-fourths of those with reflected lips, are thus provided. In some species these appendages assume the form of folds rather than teeth; and in

others we have simple threads or laminæ revolving within the aperture in the course of the spire. They are not formed until the shell has attained its full growth.

The genera not furnished with an external shell were grouped into one family of *Limacidæ* by Binney, who thus describes their habits. They are more especially nocturnal than the other families of the order, and they are so rarely visible in the day time that thousands may be near without being known. The injury which they commit in kitchen-gardens, for this reason, is often vaguely ascribed to worms or to birds, and no measures are taken against the real culprits. Their habits, in general, coincide with those which have been described as distinguishing the shell-bearing species, and I shall therefore only mention here, those which are peculiar to them. They differ from the other families in not possessing the faculty of hibernation, or suspension of their organic functions during the cold season. In temperate latitudes the snails hibernate, under all circumstances, on the approach of cold weather; the slugs, on the contrary having the power of resisting extreme cold, continue in their usual haunts until severe frosts set in, when they retire into the earth and other sheltered retreats. Here they remain in a state of inaction and partial torpidity; the functions of the body, however, still going on, though slowly and with diminished force. A slight increase of heat arouses them and stimulates the organs to renewed action, and they accordingly often come abroad in mild weather even during the winter. Those which inhabit cellars and other protected situations are in motion throughout the year; and individuals of all the genera and species which I have kept in confinement have continued active, fed freely and increased in size as much in the coldest months as in the summer.

All the species which have yet come under my notice possess the power of suspending themselves in the air by a gelatinous thread. This they affect by accummulating a quantity of tenacious mucous at the posterior extremety of the foot, which they attach to the object from which they are to commence their descent; then, loosing their hold, they hang suspended by this point. Continuing the secretion, their own weight attenuates the mucous attachment, and draws it out into a thread. As this dries and hardens, a fresh supply is afforded, the thread is lengthened, and the animal lets itself down any desirable distance. At this time, also, the margin of the foot pours out mucous freely, and during the whole operation the locomotive disk is in active undulatory motion, in the same manner as when in ordinary progression. It appears in this way to guide and force towards the extremety the mucous which is secreted on its surface, and which collected, at its extreme point, forms the thread. The slug often pauses in its descent, and extends its eye-peduncles and its whole body in various directions, as if seeking some object on which to make a lodgement. The faculty of suspending themselves in this manner indicates that they pass some part of their lives on trees, from which they can thus make a convenient descent to the earth; there are some species, indeed, which are stated to inhabit trees almost exclusively. It may serve also as a means by which they can suddenly escape from the attacks of their enemies, and particularly of birds. It is mostly, however, when they are young, or at least not grown to their full size, that they enjoy this power. Those which have attained their extreme dimensions and weight are too heavy to trust themselves to so frail a support. They have no power to elevate themselves again, and in this respect are inferior to spiders, which can both lower and raise themselves by the aid of the secreted thread. Like the spiders, however, they often remain suspended in mid-air for a time, and it is not unlikely that there

is some pleasurable sensation connected with the act, which induces them to thus prolong it. Dr. Binney states that he had seen the descent actually practiced by every one of our Atlantic species.

Besides the watery fluid which at all times lubricates the integuments, the animals can, at their will, secrete at any point or over the whole surface of their bodies, a more viscid and tenacious mucous than is usually exuded. This power is used as a means of defense. Whenever a foreign substance touches them, immediately a quantity of this mucous, of the consistence of milk, and nearly the same color, is poured out and forms a kind of membrane interposed between themselves and the irritating substance. So, also, when they are surrounded by a corrosive gas, or are thrown into water or alcohol, they form over themselves in this way, a thick protective covering, which is undoubtedly a non-conductor of heat and inpervious, at least for a time, to liquids. Shielded by this coating, they can live the greater part of a day immersed in water, and for a shorter time in alcohol; and M. Ferussac asserts that they have survived for hours in boiling water. They leave a trace of their usual secretion on every object over which they pass and thus can easily be traced to their retreats. The ordinary secretion is most abundant at their posterior extremety. The secretion of the mucous fluid over their surface is necessary to their existance. Death immediately follows the failing of this power, and is preceded by the drying up on the skin.

(To be continued.)

New Discoveries at the Wood's Holl Mass. Biological Station.

Proffessor Jacques Lœb of the University of Chicago, working at Wood's Holl, has succeeded in developing from the unfertilized egg of the sea urchin, by chemical treatment, living and normal plutei, or young sea urchins. He is led by further experiments to believe that this can be done with all marine animals, and reasoning from this discovery and from the work of his colleagues he has come to the conclusion that similar results are possible with mammalians.

In the summary of the year's work at Wood's Holl the discovery is announced in the following terms:

"The unfertilized egg of the sea urchin contains all the essential elements for the production of a perfect pluteus. I consider it possible that only the ions of the blood prevent the parthenogenetic origin of embryos in mammalians, and I think it not impossible that a transitory change in the ions of the blood may also allow complete partheneogenesis in mammalians."

The statement contains the announcement of a theory of generation and reproduction which is almost revolutionary.

Wood's Holl is a little village on the end of a neck of land which forms the southeastern shore of Buzzard's Bay. There in 1888 was established the Marine Biological Laboratory at which the marvelous results of the last summer have been achieved. It had its origin in a marine biological school established in 1873 on the Island of Pennikese, near Wood's Holl, by Alexander Agassiz, which lived but two seasons. A later attempt was not successful at Annisquam. In 1888, however, several colleges united in forming the present institution under the direction of C. O. Whitman, now professor of biology at the University of Chicago. Under his lead the work became systematic.

The simple forms of sea life proved to have wonderful possibilities for study and investigation by the trained scientist, and to throw light on the more complex systems of the higher animals. Wm. T. Sedgwick, Edward G. Gardiner, and Edward O. Jordan of Massachusetts Institute of Technology, C. B. Atwell of Northwestern University, and F. L. Washburn of

Ann Arbor were among the investigators at the school during its first year. The labratory was housed in a two-story frame building, and was supported by donations. Year by year its work has grown, the laboratories have been enlarged, course after course have been added to the curriculum, facilities for investigation have been increased, and the corps of scientists who spend each summer their entire vacation at this seaside institution studying marine growths has grown larger. Nearly all who have worked there, being biologists, have been believers in a chemical theory of life. They have believed that life originated on the earth through the combination, in the course of natural evolution of the world, of the chemicals which compose simple protoplasmic cells; that through the long course of countless centuries these growths have modified, influenced by circumstances and the change of the world about them, and have gradually produced by natural means all that is living on earth today. Species have differentiated by natural means, and from a single cell to a man there has been a steady and a constant growth.

This has been their theory. To establish it they have sought to produce artificially that combination which becomes, instead of a mere combination, a unit—a cell—and which has the power of moving itself and of growing and reproducing itself. Toward this they have wrought constantly, and step by step they are approaching their goal.

Among the workers at the school in previous years W. N. Norman, profesor of biology in the University of Texas, was among the most ardent. Profesor Norman discovered that if he added to sea water, in which were the unfertilized eggs of certain marine animals, salts of magnesia to increase the water to a certain density, the eggs began to develope. They never produced larvæ, but grew into unformed masses of cells, which broke up as soon as they were placed in normal sea water. On this Profesor Norman was at work a year ago when his efforts were ended by an attack of typhoid fever which caused his death in Boston. This segmentation of eggs of marine animals also was accomplished by other students at the laboratory. Seeing in it the possibility of great developments, Profesor Loeb took it up where Norman left off. His discovery is the result.

The sea urchin is one of the commonest of marine animals. It is found in great numbers along the shore of the north Atlantic. To the casual observer it consists of a ball of prickles, about the size of a fist, which moves in the water. Examined more closely these prickles are found to be spines projecting from a shell which has a single small opening underside, in which is the mouth of the animal occupying the shell.

As among fishes, there are among sea urchins two separate sexes. The female deposits her eggs in secluded spots in the rocks along the shore, and the deposit of milt fertilizes them. The eggs, then left to themselves, hatch, or develop, in a few hours into blastulæ, and grow thence through the gastrulæ stage to plutei. As plutei they live for some time, just as a young frog exists as a pollywog, at length appearing as their parents did before them as sea urchins, clad in shells and spines.

For the purpose of his experiments Prof. Leob secured eggs from a female sea urchin which he was ceriain had not been fertilized. These eggs he placed in water containg solutions of various salts. Calcium, sodium, potassium, and magnesium were used. He found that when he put the eggs in a calcium solution no result was obtained. When potassium was used they developed slightly. In sodium they slowly evolved into blastulæ, but in magnesium solutions these later forms were produced in two hours, and within twenty four hours these blastulæ, having been placed again in normal sea water, developed into active and vigorous plutei. The experiments were a complete success, and magnesium

chloride the successful medium for development.

Not content with his own assurance that the eggs were entirely unfertilized, Profesor Loeb took from each group used a portion which he immersed in sea water to develope in the natural manner, and in each case they remained unchanged, showing no growth.

Having succeeded in developing the eggs by chemical means, he then began experiments to learn why they did not normally develop in sea water, without requiring to be fertilized. He added to his solutions various other ions, and found that as the amount of calcium or potassium in the water was increased it became more difficult and, at last, impossible to develop the eggs. The fact was plainly established that the milt needed to carry the eggs to fertilization nothing more than certain ions to counteract the restraining elements in the sea water.

The possibilities of this little discovery startled the little colony by the seaside. Accustomed to examine the lower forms of life for light on the phenomena of the higher forms, the scientist at once looked for a parallel case in the human animal, and came to the conclusion that all cancerous growths are of a similar nature. Prof. Loeb is not inclined to go so far.

"We have made a wonderfnl discovery, all of us at Wood's Holl together," he says: All have done something. I only succeeded first in producing the plutei. From that, wonderful possibilities have opened before us. Many of my associates think they see in it the explanation of cancer. They do not say so loudly yet, for there are so many people who hold to the necessary presence of a bacillus to form a cancer. It may be a bacillus is there—if this theory is correct—for a bacillus makes secretions which may change the composition of the blood, or of the cells in a certain neighborhood, making for the absence of the restraint and allowing the cells to divide and grow. We can learn that only by farther experiments. I will not even say for myself that I believe it explains cancer. It is wonderful enough for me to say that that is true which is proven. But it is reasonable to believe that if a sea urchin egg can develope itself so can the egg of a mammalian."

"Do you believe that this brings you much nearer the production of life in a test tube?" Dr. Loeb was asked.

"Nearer, perhaps—in fact, much nearer: but after all it may not be an appreciable step when we come to learn the whole distance."

The discovery that a solution of magnesium salt caused the development of sea urchin eggs into normal plutei led the scientists at Wood's Holl to a long series of experiments to find what effect the solution had on other cells. A jelly fish, or sea anemone, was taken as an illustration. This is a transparent, jelly like mass that moves through the sea, pulsating regularly, waving with each motion a set of streamers which drive food towards its stomach.

Norman already had shown that when this ring of fibers was cut away pulsation stopped, and it was therefore dubbed the "nerve ring," and was believed to be the centre of motive power in the animal. This has now been proven wrong, for when the remaining portion of the jelly fish was put in water containing no calcium and a large percentage of magnesium, it immediately began pulsating rhythmically, as it had in sea water with its rings attached. Bit by bit the outer portions were cut away, and at last the merest centre of the mass was put in a magnesium solution, when it pulsated as had the rest.

A frog's leg was then experimented upon with similar results. In the frog only the heart beat under normal conditions. The leg was cut off and lay inert. It was put into a solution of calcium chloride, and was still motionless; finally it was put into a solution of sodium bromide and then into one of sodium chloride, and in each the

muscles pulsated with the rhythmic regularity of the heart. Further experiments convinced the corps of investigators laboring under Professor Whitman that only the presence of potassium and calcium in the blood prevented the whole structure of striated muscled from contracting and expanding as regularly as the heart does. That this applies equally well to mankind, and that only the presence of restraining influence in the blood prevents the pulsation of the muscles of the body, is accepted as a natural deduction by many scientists.

Step by step the scientists of Wood's Holl are learing from the marine animals causes of the phenomena in the bodies of mankind. The least eager and least prophetically inclined hardly dares express what he believes will be the outcome of their investigations. That it will revolutionize theories of life held even by eminent students of natural science up to the present day they do not hesitate to affirm. Beyond they will not go further than to declare that when the chemical theory of life is definately formulated, as they believe it soon will be, it will startle the world as it has not been startled since Darwin made public his theory of natural evolution.—*From the Chicago Sunday Tribune.*

Strange Birds and Their Habits.

Probably every stamp collector who has seen the Guatemalan stamp has noticed the beautiful and graceful bird whose portrait adorns them, says A. Hyatt Verrill, in December Popular Science. This bird, the Quetzal or Resplendent Trogan. is found only in the heavy mountain forests of Mexico and Central America, and would have been far more appropriate as the national emblem of Mexico than of Guatemala, for when Cortez first visited the land of the Montezumas, he found the kings and high priests wearing robes and head dresses composed of the brilliant feathers of the sacred Quetzal.

The male bird is a bright irridescent golden green above, and vivid scarlet below, with a graceful soft green crest, and curved green feathers hanging over the wings, while two or three of the ferny green tail-coverts extend far beyond the black and white tail, often extending a yard or more in length. The female is much more modestly dressed, hardly a trace of the scarlet appearing on her dull gray breast, while the tail-coverts are scarcely longer than the real tail.

Like nearly all the members of the Trogon family, the Quetzal lays its eggs in holes in trees, and the male bird does his share of the sitting. Unless the hole were very large this would be impossible without injury to the ornamental tail coverts, of which these birds are very proud. To overcome this difficulty the Quetzal resorts to the simple but ingenious plan of digging the hole entirely through the trunk of the tree. Thus when sitting on the nest the tail projects outside, and the bird can enter and leave the nest without the necessity of turning about.

In the same forest with the Quetzal may be found a cousin of his, a handsome fellow with burnished steel-blue back and pale yellow breast, who has a still more unique manner of nesting. One day while walking through the woods of Costa Rica, I noticed one of these Trogons perched motionless on a branch near a large hornets' nest. While watching him, he suddenly darted forward, snapped up a hornet, and disappeared. Puzzled at the way in which he vanished, I carefully scrutinized the limb, expecting to find him hidden among the leaves. Presently, to my great surprise, he emerged from the opening in the hornets' nest As these tropical hornets are unusually large and lively, I did not attempt further investigation at that time, but discovered later, that these Trogons always make their nests within the home of the hornets, and adding in-

sult to injury, feed themselves and young on their hosts.

If, while in these Central American forests, we walk along some mountain stream, and look sharply among the orchid-covered branches of the trees, we may spy a "Motmot" sitting quietly in the deepest shadows of the leaves. These Motmots are rather pretty fellows, bright olive-green above and rusty-green below, with bright blue wings and tail. The top of the head and the cheeks are shining black, bordered with turquoise. blue and violet, which is again edged with black, while in the centre of the breast are one or two black feathers.

The most peculiar feature of this bird's plumage, however is the tail, the two central feathers of which are longer than the others, and are bare shafts with the exception of a small space at the tip and base. When these feathers first grow out they are like the others, but for some reason the owner thinks he can improve upon nature by shaving. This he does by bending his head down and his tail forward, and using his strong notched bill for a razor, strips off the plumes.

The housekeeping methods of this queer bird are as strange as his shaving, for while home itself, a long tunnel in some sandy river's bank, is dry and warm, it is far from clean or inviting. Motmots, so lazy as to be averse to foraging for their young day by day, pile the nest full of dead fish and small animals, which soon becomes a mass of maggots, upon which the young birds feed until able to care for themselves. You can readily see that such a nest is not a pleasant one to rob, therefore the Motmots are seldom molested and become so tame and unsuspicious that they are called "Bobos," or fools, by the natives.

Along the fences and roadsides in Central America, one may sometimes catch a glimpse of a small reddish-brown bird, with a short stub tail, from which project two long stiff feathers. This sly and suspicious little chap is a species of wren, and judging from his size no one would believe him to be the maker and owner of the huge nests which are so common in the brushy localities where he lives.

These nests are not nearly so remarkable for their great size as for their curious and clever construction. When the wrens are ready to commence housekeeping, they select a bush or small tree with horizontal branches; across two of these are laid sticks which are fastened securely in place with tough grass and roots until a platform about six feet long and two feet wide is formed. On the end of this platform nearest the tree they build a dome shaped nest about a foot high, with thick sides of interwoven thorns. From this they build a zigzag or curved tunnel to the outer end of the platform. Across the entrance and at entervals along this passage, are built little thorn fences, leaving holes barely large enough for the birds to squeeze in and out. When leaving the nests the wrens close the doors behind them by placing thorns across the holes. The big dome is filled half full of leaves, soft grass and cotton from the silk-cotton tree, and on this warm bed the mother wren lays her dainty speckled eggs and raises the young she has taken such care to protect from intruders.

On the broad level plains or Llanuras of tropical America are many giant trees standing singly or in groups, and in these the "Caziques" or "Pendulas" build their wonderful swinging nests, sometimes fairly covering the trees, so that from a distance they look like huge pear-shaped fruit. The Pendulas (of which there are several species, the largest about the size of a crow,) are relations of our northern Orioles. They are much alike in color, dark seal brown with the exception of the tail, which is a bright golden yellow, and hence they are known as "yellowtails" in Nicaragua. Their bill is very large and strong, with a broad

horny shield on the forehead and a point like a needle.

The nests of the Pendulas are woven entirely of long tough grass and often are six or eight feet in length, and are so strong and closely made that, although they sway with the slightest breeze, yet even in the hurricanes they are seldom blown down or the eggs broken. The lower part of the nest is a large pouch which tapers to a point and is fastened to the tip of a branch by a single strand. The opening is about half-way up the side and so cunningly designed that it is very difficult to discover being merely a small slit held tightly closed by the weight of the lower part of the nest. In the tropics the greatest enemies of the birds' eggs are the monkeys, and it is to foil these mischevious pests that the Pendulas build such curious nests and select such open situations in which to put them, for doubtless the yellow-tails have learned by experience that the monkeys rarely venture out of the protection of the forests

You have all read of the "tailor bird," who builds his home within leaves sewn together by the aid of his bill for a needle and a tough root for a thread. But this feathered tailor is not unique in his manner of nesting, for in the same country with the "yellow-tails" and motmots is found a little black and orange oriole, who uses the needle given him by Nature with even greater skill than the better known tailor bird. This fellow selects for a home a new and large banana leaf, the two drooping sides of which he sews together with grass. Not only are the stitches so fine as to be hardly noticeable, but the little sewer even takes the precaution to run the stitches with the grain of the leaf and close beside one of the narrow veins. Inside of the green and living pocket thus formed, the nest of soft hair and grass is built, and the mother rears her young in safety, with never an outward sign of the hidden treasures within.

Football.

There is much in December OUTING which appeals to college men and all who are interested in amateur sport. There are ten pages of football matter alone, comprising dates, scores, and a concise description of *all the important games* played in the East, Middle West, and South, finely illustrated. It is just this record matter which makes OUTING invaluable. It is in the handiest form for reference, and is to be found nowhere else.

Librarian of Congress Writes on Library Work.

Herbert Putnam, librarian of the Congressional Library at Washington, D.C., has written an article for publication in The Ladies Home Journal on "What it Means to be a Librarian." This vocation and its requirements are probably less understood than those of almost all other callings demanding special training, and Mr. Putnam's article will be helpful in pointing out the entrance to a constantly widening field of employment. Mr. Putnam, previous to his accepting his present position, was librarian of the Boston Public Library, and is regarded as the head of his profession; consequently, his article will have the especial value of being authoritative and practical.

The Rajah's Diamonds.

In an article on the "The Romance of Lockmaking," in CASSELL'S MAGAZINE for December, Mr. Randall Roberts tells a good story of the ingenious device by which the disappearance of an Indian potentate's diamonds was brought to an end. "His Highness applied to Messrs, Chubb to help him out of his difficulty. It should be mentioned that only seven of his servants had access to the box which contained the jewels, and apparently it ought to have been an easy matter enough to discover the culprits; but the thefts were so well organized that all ordinary methods of detection failed, and whether the rajah dismissed his retinue or put them to death on suspicion, the thefts continued with unvarying regularity.

Christmas Presents.

THE GIVING OF GIFTS AT CHRISTMAS SHOULD BE MUCH SIMPLIFIED.

In the December Ladies' Home Journal Edward Bok writes in a vigorous deprecation of the complicating of Christmas. "Much as we need simplicity in all the phases of our living," he contends, "its greatest need is sometimes felt at Christmas. And it seems a pity that we cannot make a beginning there. We could if we would simplify this question of presents: if we would leave out of our consideration all but the natural promptings of our hearts. If ever material consideration should be dismissed from our minds and lives it should be in connection with Christmas. If ever our friends should see our hearts—our real inner selves—it should be on Christmas Day. Not that we should be other than our real selves on other days. But as it is, we are not our actual selves on the day of all days we should be. See how we strive that our present of this year shall surpass the one we gave last year! See how instinctively we think of the material value of what we give, and actually of what we receive! See how we wrong ourselves by leaving needful things undone and inviting illness because we feel we must give something of our own making to a friend, when really a sigh goes into each stitch, instead of being frank with ourselves, and pleasing our friends infinitely more by being frank with them, and purchasing something at far less cost to our health. Every woman knows what I mean by this: the great evil of "making things' for Christmas presents when really neither the time nor the strength can be spared. In much the same way we complicate Christmas at the table."

Musical Crows and Vegetable Caterpillars.

(Henry D. Lloyd in the December Atlantic.)

The crow in New Zealand strikes as sweet a note as any heard in the woodland, says Henry D. Lloyd in the December *Atlantic*. The robin has no song and no red breast; the native hen is the greatest of rat killers; there is a caterpillar which turns into a plant. These and some other productions of nature have done for New Zealand what the kangaroo and the ornithorhynchus have done for Australia,—given it the suggestion of oddity and the marvelous. Rabbits and sweetbriers, introduced for pleasure, spread like wildfire, and it is an attraction to be duly advertised in the sale of lands that it has been cleared of sweetbrier and fenced against rabbits; and then later, the rabbit becomes a profit instead of a pest, and is exported by millions to feed the English.

(*Selected from New Zealand Newest Emgland, by Henry D. Lloyd, in the December Atlantic.*)

The December Atlantic might in some senses almost be called a Chicago number, for three of the most striking and salient articles are by Chicago authors. Harriet Monroe's "The Grand Canon of the Colorado" is a brilliant and eflective sketch of nature and natural scenery; Mrs. Elia W. Peattie's lively "The Artistic Side of Chicago" pictures the æsthetic, artistic, educational, and literary features of the great city, while the short story "The Detectives," by Will Payne, is a capital example of the power of Chicago writers in romantic fiction. Chicago has reason to be proud of her contributions to this number of the representative magazine of America.

The Companion for the Rest of 1899

During the remaining weeks of 1899 THE YOUTH'S COMPANION will maintain its fresh and varied interest for young and old by presenting articles from the pens of eminent men and women and stories by the most gifted writers of fiction

Among these contributors will be Frank R. Stockton, who presents a droll story, "The Wolf and the Wheelbarrow;" James Bryce, author of "The American Commonwealth" who offers "Hints on Reading;" W. D Howells and Jane Barlow, each of whom contributes a serial story; Bret Harte, who recalls an early California experience in, 'How I Went to the Mines;" Mary E. Wilkins, who tells of 'Sereny Maria at School;" and Henry M Stanly, who under the title, 'For Life and Liberty," relates a thrilling adventure of his travels in Darkest Africa

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Walter F. Webb, Editor and Manager

Albion, N. Y.

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Notes on American Land Shells.

[Continued from December Number.]

All the species are extremely voracious, and devour an incredible quantity of food in a short time. Those found in this country are generally supposed to be vegitable feeders, but nearly all of them subsist occasionally on animal matter, of which they seem to be fond, and when in confinement sometimes attack and devour each other; and the foreign genus Testacella, is known to prey habitually upon earthworms. It is probable, therefore, that in their natural condition all of them at times resort to animal food and devour earth-worms, insects and their larvæ, and such animals, as, inhabiting the same retreats, are like themselves slow of motion and defenceless. It is certain, however, that the principal food of those species which frequent the neighborhood of gardens and houses consists of the tender leaves of succulent plants and of ripe fruits. Upon these, in Europe, they perpetrate serious ravages, often destroying in a night the labors and hopes of the gardener, and in some years committing so much injury and interfering to such a degree with the prosperity of the agriculturalist that they are ranked among the scourges of the country. Like catapillars, locusts and rats, they are considered to be perpetual enemies and a war of extermination is carried on against them. To limit the extent of the evil many remedies have been proposed, and among others the prayers and exorcisms of the church have been claimed, but without any considerable abatement of it. Happily, we are not in this country subject, in the same degree, to the mischief done by these animals, for their excessive increase is kept in check, probably, by the vicissitudes of the climate; but it may be useful to know that a border of ashes, sand or sawdust, laid around the bed containing the plants it is desired to protect, will prove an impassable barrier to the slugs, so long as these substances remain dry. When the slugs attempt to pass the barrier they become entangled in the dry ashes or sand, which envelops them entirely. The particles of these adhere to the viscid surface of the animals which, in vain endeavoring to disengage themselves from by secreting their mucous, at length become exhausted and die.

Their growth is remarkably rapid. The young have been known to double

their size and weight in a week. The earliest hatched young of the season generally attain their full maturity before the end of the first year, although they may afterwards increase somewhat in bulk. Those which leave the egg at a later period mature during the second year. Individuals kept in confinement and fully fed reach a much greater size than when in their normal condition. They possess in a remarkable degree the power of elongation and contraction of the body. When fully extended it is long, narrow, more or less cylindrical, and generally terminating in a sharp point. The carina of the carinated species disappears. The head is protruded far beyond the mouth, the eye peduncles are long, slender and graceful. The mantle is changed from an oval to an elongated form, with parallel sides and rounded ends. The glands are lengthened, lose their prominence and appear nearly smooth. But when alarmed by the touch of a foreign substance an instant change occurs, and a sudden contraction takes place. The eye peduncles and tentacles are retracted and the head is drawn under the mantle. The anterior edge of the mantle is brought to the level of the foot, and its form becomes nearly circular. The body is shortened to one fourth its former length and tumid; the back is rounded and rises high in the center, and the skin is rough with prominent glandular protuberances. The carina, when it exists, become conspicuous. This is the form which they assume in their retreats when they retire to protect themselves from the effects of drought and cold. It differs so much from their form when in motion that one not well acquainted with them would hardly recognize the same animal in its new shape. It is among the *Limaces*, perhaps, that the change is most striking and the difference of form between the extremes the greatest

They commence reproducing their kind as early as the end of the first year, before they have attained their full dimensions, and hence the eggs of the same species often vary considerable in size. These are deposited in a cluster of thirty, or thereabouts, in the soil and in other moist and protected situations; or if the species be one that frequents houses, then in the crevices or corners of the walls or under the decaying planks of cellars. In general form and appearance they resemble the eggs of the shell-bearing genera, but differ from them in several important particulars. The eggs of the snails are all opaque, while those of the slugs are more or less translucent, permitting in the Limaces a view of the cicatricula, and affording an opportunity of observing its developments. Those of the former are all deposited free or unconnected, except by a slight agglutination; those of the latter, in some of the species, are connected together by a prolongation of the outer membrane at their longest diameter, thus forming a sort of rosary. The deposits of eggs, when made, are abandoned by the slug, which then removes to some other convenient place. A considerable number of separate deposits are made during the year.

Nature Study.

We are coming to a day when the importance of the study of Nature is beginning to be recognized. In many of the Normal Schools instructors in "Nature Study" are already employed, at teachers' institutes "Nature Study" is becoming a common topic for the lecturers, and in academies and colleges collections are being made, and museums established. Although many of the lectures, and not a few of the instructorships give evidence of attempting to carry on a large business upon a small capital, and although the collections are for the most part entirely unorganized and in snch a chaotic state that the instructors can make but little use of them, they prove that there is a growing desire—vague though it may be—for more thorough and sys-

tematic work in the study of natural history.

One of the most common mistakes that the individual collector makes is to imagine that he should begin with something that is not readily accessible. The person who lives among fossiliferous rocks yearns to collect and study sea shells. One who lives at the sea shore takes no interest in the mollusks, crabs, and star fishes that are so common, but would like to collect minerals. Now, this is no yearning for the study of nature: it is simply a desire for something new or queer, that may be satisfied, possibly, with a collection of tin tags, buttons, or scrap pictures.

The student of nature must make a collection. To make this collection, begin right. Collect something common, that you see every day, be it mineral, mollusk, fossil, insect, or plant—anything within the realm of mineralogy, zoology, or botany. Learn all that you can about it by a careful examination with the naked eye and a good pocket lens. Then supplement this knowledge with all that you can learn from such books as you have or can buy or borrow. If you do not thus obtain the information you seek, put yourself in correspondence with a naturalist who can furnish the desired information. Then label and catalogue your specimen, and take good care of it. As soon as your collection assumes sufficient proportions to require or even permit it, classify, and arrange all that you have, and thereafter always label, catalogue, classify and arrange each specimen as soon after you collect it as possible. Never leave specimens in an unorganized condition for weeks and months, waiting for a "more convenient season". It will make you an unsystematic and slovenly naturalist, and be very likely in time to take away your love for thorough work in any line of science. If you would enlarge your collection beyond the results of your own personal collecting, gather large numbers of duplicates and exchange them with other collectors, whose addresses may be easily obtained from science papers.

It should be a fixed principle with any collector, or any person in charge of a collection, that any specimen worth a place in a collection should be made to show to the best possible advantage.

Nice type or pen printed card labels, and pure white trays, and suitable devices for showing small specimens to advantage should be used.

A collection should be—yes will be, a monument of the taste displayed by the collector, or a standing advertisement of the systematic—or unsystematic—management of the educational institution possessing it.

It is not to be expected that the chancellors of universities, can give their time to the proper inauguration of their museums, even if their knowledge of natural history would enable them to do so; but they should never forget the story that a well equipped museum will tell to their students, and to all who may even visit the educational institutions over which they preside.

The adage "A thing of beauty is a joy forever," holds as true of a natural history collection as of any thing else, and museum inauguration is becoming an art calling for a specialist. Most universities and many colleges, and academies and normal schools have, and all should have, permanent curators, not only to properly organize the material they possess, but to augment the collections by means of exchanges and purchases. Schools that cannot afford to employ permanent curators, should have their collections properly organized by persons whose knowledge of natural history, and whose taste and experience in such work qualify them to do the work. After a thorough organization of the accumulations of years, accessions may often be safely intrusted to the instructors.

It should be remembered that specimens bear the same relation to nat-

ural, that apparatus does to physical science, and deserve the same care.

CHARLES LE ROY WHEELER,
Prompton, Pa.

A Trip to Fauquier Co., Virginia; With Notes on the Specimens Obtained.

On the 14th of June, 1899, I left Providence, R. I., for a little spot about fifty miles west of Washington City, in the Bull Run mountains of Virginia. In the summer of '98 I visited in this locality and I knew it to be a good country for collecting.

I reached my destination in the evening of the next day and was warmly welcomed at the pretty little cottage of Mr. White who was to be my host during the few weeks that I could spend in this paradise for a lover of nature. The cottage is situated a short way up on the mountain side and is really shut in on three sides by the slopes of the mountains, so that on all these sides there is, in summer, a continuous bank of dense green foliage. The exposed side gives us a glimpse of the surrounding country, including a bit of the railroad and a stone mill.

This country is but little worked over by collectors. In 1898 when I was in the same district for two months I did not hear of a single specimen of the genus "collector." Naturally with so few people to bother them birds are quite abundant and the same is true of specimens in other branches of the animal kingdom.

There is a small stream of water, "run" they call it, which passes through their district and the banks of this stream fairly team with animal life. There are all kinds of wooded and brush patches on the mountain sides and at the very top of the mountain on which Mr. White's cottage (Bee Cottage I shall call it hereafter) is situated is a huge pile of boulders called "Buzzard's Peak." This rock pile is the breeding place for numerous turkey buzzards and in its crevices many a wary fox has made his lair.

I had come prepared to collect specimens of all kinds but it was not my intention on this trip to do any great amount of collecting. I wanted rather to ramble around, get better acquainted with the country and people and while doing this to pick up more or less material for my collection. I had my camera along also and "took" many a pretty bit of scenery.

Many people seem to have a very wrong idea of the climate of our southern states and of the South as a whole. I have been in Fauquier Co., Virginia, all the summer months and I have seldom found it as hot there as at my home in Providence, R. I. Then too I have worn a medium weight sweater at the equator without finding it uncomfortable. Perhaps I should explain that this last experience was at the Galapagos Islands which possess a cooler climate than most equatorial countries. The climate of the Bull Run mountains is generally very pleasant. If there is any breeze you are almost sure to get it at Bee Cottage. There is a difference of several degrees in temperature between the cottage on the mountain side and the railroad station which is located in a gap between two mountains only a mile distant.

The first two days I spent in getting settled. On the morning of the next, one of Mr. White's daughters came into the house to inform me that there was a "peckerwood" in a tree in the yard. I immediately took my gun and went out to investigate thinking that perhaps it was a Pileolated Woodpecker, a bird I wanted to obtain. I was mistaken, however, for instead of a Pileolated It was a Hairy Woodpecker which was pecking away industriously in the topmost branches of a large locust tree that stood very near the house. I shot it and made up its skin soon after, this making my first capture.

A little later in the day, accompanied by Mr. White's youngest son, went on a salamander hunt up the mountain side. We turned over all the old logs and stones that we could find and secured quite a number of specimens of small salamanders of several species. The red-backed (*Plethodon erythronotus*) appeared to be the most common and we found them of all sizes from little fellows not much over an inch in length to good sized adults measuring three and a half inches. They seemed to live under both stones and old logs and in some cases we found several near together under the same covering. The young were found in nearly every case with the adult specimens and as they were very easily captured it is possible that they are more quiet when with their young. I quote the following notes in regard to this species from the "Report of the Geological Survey of Ohio."

"The Red-backed Salamander is the first of this group seen in spring, having been observed in the middle of April. I found them near Vassar College in New York state, on April 6, 1878. It occurs in moist woody places, hiding under stones and old logs, and when these are upturned, it, if alone, quickly disappears in the decaying wood, moss, leaves or earth; but if accompanied by its young, neither it nor its little ones attempt to escape until touched. It climbs glass by adhering with its abdomen, is frequently on herbs, and, if disturbed, springs away by a sudden uncoiling. They are very agile in their motions, walk rapidly, run by sudden and irregular jerks and have been kept alive an entire year by allowing them dead leaves constantly moistened. Their food appears to be small snails. When the young are found, as a rule, they are accompanied and often apparently being fed by their parents, but are occasionally alone. Their little ones, as well as their eggs, occur under the moss and bark of decayed trees. The latter are found in bunches of from six to eleven each, and individually are about three-twentiths of an inch in diameter and have been found in June at Ann Arbor, Michigan; Fitchburg, Massachusetts; and in August in the White Mountains.

"The young are supplied with branchiæ, but lose them early, that is, three or four days after hatching. The little ones usually have the same markings as the adult but are often bright red, spotted with black. The younger larvæ are nearly white, the older olive with dark spots. As age advances the color deepens, becoming a brown, and very old specimens often have a purplish tint."

This gives us a very good idea of the life history of this little salamander. I found the color of the dorsal stripe to vary considerably in my specimens. In some it was much more yellow than red, and in many of the younger individuals it was mixed with a good deal of black.

Before going any farther with the account of my walk I should like to give some account of the other species of salamanders which I found at this time, it being my intention to make this paper, as far as possible, a collection of notes on various animals observed during my stay in Fauquier Co., Virginia.

Perhaps the most abundant species next to the Red-backed was the Gray Spotted or Viscid Salamander (*Plethodon glutinosus, Green.*)

This species is larger than the preceding, adult specimens measuring nearly six inches. I found it in damp situations under logs and stones. If I remember rightly I found most of my specimens near the top of the mountains. Its general color is black, dotted all over the back and sides with spots of gray, these spots being larger on the sides. There are fourteen costal furrows, a distinct cervical fold and a longitudinal furrow along the back. This furrow is much more distinct in some specimens than in oth-

ers. I quote a short paragraph from Cope's "Batrachia of North America" as to its distribution and habits:

"The range of this species is from Texas to Maine. It appears to be common in Massachusetts and Maine.

"This salamander is entirely terrestrial in its habits. It is found much more abundantly in the mountainous districts and haunts rocky localities as well as forest mold and fallen logs. I have found it more abundant in New York than in southwest Virginia. I believe that it prefers a cool climate. In the flat and warmer tertiary and cretaceous eastern coast region it is rare. In southern Pennsylvania I have only found it on the northern exposure of the south Chest valley hill and never on the southern exposure or other parts of the north hill. In southwest Virgiuia it is more common in caves than on the surface."

I saw a good many specimens of the red newt (*Diemycthes miniatus*). This species is about three and one-fourth inches long. The color of the back and sides is a bright red which is apt to disappear in preserving liquid. On each side is a row of five or more ocellate spots, while the whole under surface is covered with small black dots. Often after a storm these little fellows appear in considerable numbers in some localities. I have noticed this fact both in Virginia and in Rhode Island and have heard that it holds true in Connecticut. That they eat each other is a fact easily learned by confining some in a small box for a few weeks. They will disappear one by one, the larger ones remaining alive the longest, and an apparent increase in the circumference of one individual is a sure sign that the life of another has been sacrificed.

There is quite a full account of the habits of this species in the Geological Report of Ohio which I think is worth quoting at length:

"The Crimson Triton is found under stones and decayed wood and leaves and also in brooks and pools. Holbrook observed them swimming with vivacity under ice an inch thick. Storer found fragments of Lymnea, Physa, insects and spiders in their stomachs and also ascertained that they cast their skin in June and that the new cuticle was in every respect similar to the old, They are not so rapid in their motion as *Plethodon erythronotus*. In confinement they thrive well if allowed a daily supply of fresh water and a sufficient quantity of flies which they siezed and swallowed apparently by several continued efforts. Their eggs are laid attached to weeds and grass in shallow water in albuminous masses, looking somewhat like those of frogs, and the young does not lose its brahchiæ until late in development,

"Mr. Howard A. Kelly relates that he has taken the Red Egt *Notophthalmus* (*Diemyctlus*) *viridescens*, found in Sullivant county, Pennsylvania, and kept them in a dark box filled with moss and saturated with water, and that all the specimens thus treated changed from the vermillion of the *miniatus* to the dull or olive of the *viridescens*; that upon being thrown into water they struggled to land but soon returned to the water, returning to the surface at intervals for air. They were kept alive for some time and always seemed satisfied with their aquatic residence. Such an observation would seem to indicate that instead of specific or even varietal differences in this species we have simply the changes due to age and condition."

Cope in his "Batrachiæ of North America" states that *L. miniatus* is identical with *D. viridescens* and that the two forms are stages of "one and the same animal." He says that the differences between them are simply those caused by changes in season and environment.

In the cold mountain springs I found many specimens of the Spring Newt (*Desmognathus fusca*). This is an active species. It seems to prefer shal-

ow running water and, where disturbed, will disappear with great rapidity amongst the weeds and gravel, its dusky color aiding in its concealment. The average length is about four and one-half inches. The color is generally brown above, with gray or pink shades, both the sides and belly being marked. Cope mentions a variety of *D. fusca* as occurring only in the southern states but I did not secure any specimens of it.

This salamander hunt occupied several hours and was rather tiresome physically but I felt well repaid as did my assistant by the number and variety of specimens secured. Upon reaching the house again I put the salamanders into five per cent. formalin, keeping the different varieties separate and labeling all fully so that data would not be lacking when I came to study them at home.

From this time on I took trips almost daily, sometimes with ornithological intent, sometimes after snakes or turtles, but always with a deep respect for the beautiful panorama of nature constantly changing before me as I wandered over the hills and through the valleys. I shall not try to give an account of these trips in any regular order but shall dwell more particularly on a few excursions that were of especial interest to me and on the specimens secured.

Being desirous of collecting some rough skeletons of mammals, I interested one of Mr. White's sons, a noted trapper, in my behalf and together we set a line of traps up to the very top of the mountain—the rock pile which I have mentioned before as being called Buzzard's Peak." Every morning early for several days we made the round of these traps, but finding game rather scarce we finally gave it up. I will give a few brief notes on the mammals obtained including also a few species which Mr. White traps every winter.

Vulpes fulvus (Red Fox). This species seems to be fairly common in the northeastern part of Virginia. In the vicinity of Mr. White's cottage they were quite plentiful although hunted a great deal with hounds. On two occasions I saw one enter almost into the dooryard and that too in the daytime. Neither of these animals seemed particularly disturbed at seeing me but turned around slowly and loped off through the wood. The hounds belonging to the people in the vicinity sometimes get loose at night and on these occasions they have a grand fox hunt of their own, spending a whole night in running around and barking.

Vulpes virginianus (Gray Fox). While not as common as the forementioned species the Gray Fox is still taken not infrequently. I did not see one at all but on several occasions when the hounds were having one of their noisy hunts Mr. White told me they were after a Gray Fox. He said that there was a difference in the course taken by the two species of foxes when pursued by hounds, the Gray Fox keeping for as long a time as possible in a comparatively small area dodging back and forth in hopes of throwing the hounds on a false scent, while the Red Fox relied more on its legs for escaping. Mr. White traps several each year.

Putorius vulgaris (Weasel). I believe this species to be quite common. Have heard the residents mention it as being destructive to their chickens which are also subject to attacks from the Fox, Skunk, Mink and Rats. I saw only one specimen.

Putorius vison (Mink). The Mink is quite common, finding excellent dwelling and hunting grounds along the banks of the various winding streams with which this country is well supplied. Mr. White traps many each winter.

Lutra canadensis (Am. Otter). During the winter of 1896 Mr. White caught his first specimen of this species. Since then he has caught two or three each winter and said that he

thought that by employing a larger number of traps and extending his range a few miles he might obtain even more. This would indicate that the Otter is fairly common in this vicinity at least and since they are but little molested their numbers should be on the increase.

Mephitis mephitica (Skunk). A very common species. During the past three or four years Mr. White has trapped about five hundred within a radius of eight or ten miles and they are still abundant.

Procyon lotor (Raccoon). The Raccoon was at one time common in northeastern Virginia and it is not infrequently taken now. "Coon hunts" used to be of frequent occurrence in Fauquier county, but with the great decrease in the number of "coons" the practice has been to a great extent abandoned.

Atalapha noreboracensis (Red Bat). Every evening numbers of these little bats would appear, flying swiftly about in their search for insects.

Lepus americanus var. *virginianus* (Southern Varying Hare). Common all through this section where it is much hunted during the fall and winter.

Neotoma floridana (Wood Rat). Several were caught in one trap. They appear to be very abundant.

Fiber zibethicus (Muskrat). Very common along the banks of the streams.

Sciurus hudsonius (Red Squirrel). Mr. White informed me that the Red Squirrel was quite scarce. I did not see any during either of my visits.

Sciurus niger (Southern Fox Squirrel). Fairly common, though according to all accounts it is not nearly as plentiful as it was a few years ago.

Sciurus carolinensis (Gray Squirrel). Squirrel hunting is a common sport in Virginia and catching the infection I accompanied one of the neighbors on two or three of his trips. Either the squirrels had temporarily left the county or else they were entirely too shrewd for us as I never had worse luck in any hunt. I believe we secured one squirrel each time and I remember one morning we hunted for several hours without firing a shot, securing one squirrel from its hole, some fifty feet up in a large tree, by means of a pliable forked stick. By inserting the forked end of the stick into the hole as far as possible and twisting it around a few times a hold was obtained on the tail of the squirrel and it was pulled out and brought down.

At Bee Cottage they had a squirrel of this kind which they had raised by hand from a very young specimen. There was no cage to confine him. He was perfectly free to go and come when he pleased and he seldom failed to show up at meal time when he would jump from one person to another in search of eatables, not infrequently leaving scratches to show where his sharp claws had struck. Peanuts were an especial delicacy for him. As a rule he was fed with kernels of corn though he ate most anything of a cereal nature. The rapidity with which he could take up the corn kernels, eat the germ or "chit" and throw the rest away, was astounding. It fairly kept one busy to supply him with fresh ones. He seemed to like to be fondled and would enter into a romp as though he enjoyed it, though if roughly handled he would lose temper and disappear for a half day or more. I believe that "Buzzer" as we called him has recently left civilization for the woods to fall a victim no doubt to some hunter's gun.

Sciuropterus volucella (Flying Squirrel). The Flying Squirrel is common They have had several at Bee Cottage for pets, taking them from the nest when very young and raising them by hand. They take readily to a corner of a handkerchief soaked in milk and seem to thrive well in captivity.

Tamias striatus (Chipmunk). Very common. They are often seen run-

ning along the old stone walls of the fields and roads.

Arctomys monax (Woodchuck). Common. Mr. White catches many of them in his traps and on severol occasions I saw fresh signs of them.

Didelphys virginianus (Opossum). The Opossum is quite common. Mr, White catches many of them and from him I secured several skulls. I saw one live specimen, a female, with eight or nine young about the size of half grown rats.

There are of course many species of mammals which I have not mentioned that undoubtedly occur in this section. On my next trip I hope to be able to give more attention to the small mammals, such as shrews, moles. mice, etc., many of which could be easily obtained.

One insect pest peculiar to the South is the "chigger." Though extremely small they are capable of causing a great deal of trouble and on several occasions I had rather more than I desired of their company. They seem to stay on or among the thick shrubbery of the woods and when anyone walks through this, they abandon the vegetable for an animal feeding ground. By eating their way into the skin they produce little irritating sores which increase rapidly in size when scratched. I used to lay open these little sores and treat them with antiseptics and found this a very good treatment. By taking a bath after each day's tramp through the woods one can keep fairly clean of them.

On some of the old rail fences which border Virginia roads for miles, I found the pretty little lizard *Sceloporus undulatus* quite abundant. They were not very timid and one day while out driving I killed several with the whip. They seemed to be most abundant at about eleven o'clock in the morning. When once disturbed they moved very swiftly although most of those that I noticed did not travel more than a few feet at a time.

I saw several species of snakes. A water snake, *Tropidonotus Sipedon* I think, appeared to be the most common. It is locally known as the "water moccasin" though it has no venomous qualities. This species is found along the "run" where it is not uncommon to see one or more individuals stretched or coiled on the rocks, taking a sun bath. They take to the water readily when disturbed. One small specimen of *T. Sipedon* which I pulled rather roughly out of a hole in rocks bit me in return, but I kept it alive for some time afterwards and it never in all later handling bit me again.

I secured one large specimen of the Milk Snake (*Ophibolus doliatus triangulus*) which one of Mr. White's daughters killed and brought home. There is such a general dread of snakes whether venomous or not that I always feel very much pleased to meet with anyone who is not afraid of them. Certainly the nonvenomous snakes are entirely benificial, or nearly so, and should be kindly treated and protected; and yet how often we find them all crushed and mangled where someone, ignorant of their good qualities and with no appreciation of their beauty, has ruthlessly destroyed.

I caught one very pretty little grass snake (*Liopeltis vernalis*) but this species does not appear to be very common. Black snakes (*Bascanion constrictor*) were quite abundant and I obtained several specimens, some of them being of large size. The moccasin (*Agkistrodon conetortrix*) is the only venomous snake that occurs at all commonly in this neighborhood. I did not see any of them on my last trip although I heard of several that were killed during my stay. They are found usually about the rocks and in black-berry patches and not a few are killed when the wheat, large quantities of which is grown, is being harvested. I obtained some interesting data in regard to the use of "Rattlesnake Master Weed" as an antidote for the bite of

a moccasin which I hope to use in a future article.

The interest of the northern collector is immediately aroused by the number of box turtle (*Cistudo Carolina*) or "terrapin," which one meets with in the southern states. In my own state (Rhode Island) box turtles are very seldom met with but in Virginia scarcely a day passed that I did not meet with one or more of these animals and I did not make any particular search for them. There was a great difference in the color and design of of the markings on the carapace and plation. Some individuals were almost a complete black while others were nearly covered with yellow markings. There was a considerable variation in shape also. If one can judge anything of their age by the amount that they grow in a certain number of years, some of those that I noticed must have been very old. The boys in the neighborhood often cut their initails and the date into their terrapin and I found some that had been so marked as much as fifteen years before and as they must have been of good size when the marking was done they did not appear to have grown much in that time. From this I judge they live to be very old.

I saw no other land turtles but one night we seined the run securing quite a varied collection of fish, turtles and other fresh water animals some of which I shall mention. The fish I am not well enough aquainted with to describe. I think we obtained as many as six species and they proved to be very good from an epicurian standpoint when served on the table next day. Several eels (*Augville Chrysypa*) were also caught in the nèt.

Of the fresh water turtles we secured three species; we caught one specimen, not a very large one of the "snapper" (*Chelydra Serpentina.*) The Painted turtle (*Cehrysemys picta*) appeared to be quite common. They are locally known as "skilpots" though why so named I have yet to learn. I also secured specimens of another turtle which I have not yet determined Both this and the preceding specie occur very abundantly throughout the streams and ponds of Fauquier Co.

I did not meet with any other turtles on either of my trips to this part of Virginia and think that these four species are the only ones occuring at all commonly in this section.

Many cray fish (*Cambavus affinis*) were caught in the seine and I also found this crustacean quite abundant in various springs and little streams in the neighborhood. One large female taken in August had some eight or ten young clinging to its body. Mr. White showed me the remains of some of their burrows in one of his meadows where they reside at certain periods of the year. In general appearance they are very much like diminutive lobsters and they move around in the same manner. Various other interesting animals such as insect larvae, fresh-water unios, etc., where obtained in this night seining, but I did not save these specimens and shall not try to treat of them in this paper.

So far I have not said much in regard to the birds which were very abundant both in number and species. Perhaps the most noticeable bird is the Turkey Buzzard, that famous scavenger which saves the southern farmer the trouble of burying any dead animals. The buzzards are very common in this section. I have seen twenty-five or thirty at one time flying around, often at a height so high in fact that one wonders how they ever managed to locate any objects on the ground. They breed at various points on the rocky mountain side in spring months.

Of the various other birds which I noticed I shall simply give a list which like the foregoing lists of mammals, reptiles, etc., is far more complete. I hope that the production of these few notes may induce some other collector to send in their contribution to these columns. Surely among the

great number of subscribers to this paper there must be many who have notes that would be of interest and value to us all. Let us hear from you.

Aix sponsa, Wood Duck.
Ardea herodias, Great Blue Heron.
Ardea virescens, Green Heron.
Nycticorax nycticora naevius, Black-crowned Night Heron.
Actitis macularia, Spotted Sandpiper.
Charadrius dominicus, American Golden Plover.
Aegialtis vocifera, Killdeer.
Colinus virginianus, Bob White.
Bonasa umbellus, Ruffed Grouse.
Meleagris gallopavo, Wild Turkey.
Zenaidura zenaida macroura, Mourning Dove.
Cathartes aura, Turkey Vulture.
Accipiter cooperi, Cooper's Hawk.
Buteo lineatus, Red-shouldered Hawk.
Falco sparverius, Am. Sparrow Hawk.
Asio wilsonianus, Am. Long-eared Owl.
Megascops asio, Screech Owl.
Bubo virginianus, Great Horned Owl.
Dryobates villosus, Hairy Woodpecker.
Dryobates pubescens. Downy Woodpecker.
Melanerpes erythrocephalus, Red-headed Woodpecker.
Colaptes auratus, Flicker.
Antrostomus vociferus, Whip-poor-will.
Chætura pelagica, Chimney Swift.
Trochicus coluebris, Ruby-throated Hummer.
Tyrannus tyrannus, Kingbird.
Sayornis phoebe, Phoebe.
Empidonax minimus, Least Fly-catcher.
Corvus americanus, Am. Crow.
Sturnella magna, Meadow Lark.
Spinus tristis, Am. Goldfinch.
Spizella socialis, Chipping Sparrow.
Spizella pusilla, Field Sparrow.
Melospiza fasciata, Song Sparrow.
Pipilo erythrophthalmus, Towhee.
Cardinalis cardinalis, Cardinal.
Passerina cyanea, Indigo Bunting.
Piranga rubra, Summer Tanager.
Piranga erythromelas, Scarlet Tanager.
Chelidon erythrogaster, Barn Swallow.
Clivicola riperia, Bank Swallow.
Vireo olivaceus, Red-eyed Vires.
Mniotilta varia. Black and White Warbler.
Dendroica aestiva, Yellow Warbler.
Dendroica discolor, Prairie Warbler.
Seivrus avrocapillus, Oven-bird.
Icteria virens, Yellow-fr. Chat.
Sylrania mitrata, Hooded Warbler.
Geothlypis trichas, Maryland Yellow Throat.
Anthus pensylvanicus, Am. Pipit.
Galeoscoptes carolinensis, Catbird.
Troglodytes aedon, House Wren.
Turdus mustelinus, Wood Thrush.
Merula migratoria. Am. Robin.

T. P. Drowne.

An Indian Mound Opened.

An Indian mound on the top of a bluff overlooking the Huron river at a point a few miles below Ann Arbor, was opened Saturday, November 18, by Dr. W. B. Hinsdale, dean of the homœopathic department of the University of Michigan. Within was found a skeleton, two earthen pots and about a dozen small implements. The skeleton, which was that of a man, was lying on an oval bed of burnt clay. Its head was pointed towards the west. The position of the bones seemed to indicate that the body had been buried in a sitting posture. On the skeleton's left hand was a pile of bones not human. Among these were the two front teeth of a beaver. The implements in the pots included several arrow points, a number of awls made out of antlers, a copper needle and a barbed fishing spear. The spear was also made of an antler.

The teeth in the skull were all sound

and were about one-third ground down, the edges being flat and smooth instead of pointed and sharp. The two eye teeth were slightly forward of the others.

The mound was about 15 feet in diameter, and originally several feet high, but as it had been plowed over for many seasons it had become somewhat reduced in size. The skeleton was found about four feet below the surface.

Thoreau's Mission!

(*Bradford Torrey in the November Atlantic*)

With Thoreau the study of nature was not an amusement, says Bradford Torrey in the *November Atlantic*, nor even a serious occupation for leisure hours, but the work of his life,—a work to which he gave himself from year's end to year's end, as faithfully and laboriously, and with as definite a purpose, as any Concord farmer gave himself to his farm. He was no amateur, no dilentant, no conscious hobyist laughing between times at his own absorption. His sense of a mission was as unquestionable as Wadsworth's, though happily there went with it a sense of humor that preserved it in good measure from over-emphasis and damaging iteration.

In degree, if not in kind, this wholehearted, lifelong devotion was something new. It was one of Thoreau's originalities. To what a pitch he carried it, how serious and all-controlling it was, the pages of his journal bear continual witness, His was a puritan conscience. He could never do his work well enough. After a eulogy of winter buds, "impregnable, vivacious willow catkins, but half asleep along the twigs" (there, again, is fancy of an uncloying type), he breaks out: "How healthy and vivacious must he be who would treat of these things. You must love the crust of the earth on which you dwell more than the sweet crust of any bread or cake; you must be able to extract nutriment out of a sand heap." "Must" was a great word with Thoreau. In hard times especially, he braced himself with it. "The winter, cold and bound out, as it is, is thrown to us like a bone to a famished dog, and we are expected to get the morrow out of it. While the milkmen in the outskirts are milking so many scores of cows before sunrise, these winter mornings, it is our talk to milk the winter itself. It is true it is like a cow that is dry, and our fingers are numb, and there is none to wake us up. But the winter was not given us for no purpose We must thaw its cold with our genialness. We are tasked to find out and appropriate all the nutriment it yields. If it is a cold and hard season, its fruit, no doubt, is the more concentrated and nutty."

A Correction

Dear Mr. Webb:

Some time since there appeared in the Museum, over my name. an article on our members of the carpodaci. Since then I have become convinced by further study, and by correspondence with those familiar with the birds of this county, that I was in error and that what then appeared to me to be different species were but different phases of the same species,—Carpodacus mexicanus frontalis.

Several friends in the east have written me concerning these birds and wished me to get them sets and skins of the two rarer species. This of course I cannot do, as I am now fully convinced that neither of them breed in this county.

Shonld you see fit to print this letter I will deem it a great favor, not only to myself but to any of your readers who may have been misled by my notes.

Sincerely Yours,

HARRY H. DUNN.

Fullerton, Cal.

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THE MUSEUM.

A Monthly Magazine Devoted to Research in Natural Science.

VOL. VI. ALBION, N. Y., FEBRUARY 15, 1900 No. 4

THE MUSEUM.

A Monthly Magazine devoted to Ornithology, Oology, Mollusca, Echinodermata, Mineralogy and Allied Sciences.

Walter F. Webb, Editor and Manager

Albion, N. Y.

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The New Almaden Mines.

Perhaps it would be of interest to the mineral collectors who read the MUSEUM to know something about the richest quicksilver mine in America, in fact the second in the world, the richest being those of Almaden in Spain.

The new Almaden mines of which I am to tell about are situated fifteen miles south of San Jose, in Santa Clara county, California. They are owned by the Quicksilver Mining Company of New York, who have 8,500 acres of land on which are the mines, reduction works and three villages—Hacienda, New Almaden and Spanishtown.

The mines are worked at a depth of 2,500 feet and the under ground workings are said to be over seventy miles in extent. Six shafts are in operation, which can be said are six different mines under one management, besides more than that number have already been worked out and abondoned.

The ore in these mines occur in shoots and bunches along the contact of serpentine and shales in which the vein matter is mostly serpentine, in which some portions of the vein is full of rich cinnabar, while in other portions it contains very little, the cinnabar being only in seams. Burleigh drills are used on account of the hardness of the rock, and it is found with depth as the vein matter becomes harder the less metal it contains.

After the ore is hoisted from the mines it is loaded on cars and conveyed by an incline track 700 feet long to the reduction works at Hacienda, which consist of eight furnaces that are said to include the most improved methods for reducing mercury ore.

The timbers used at these mines are of red wood 10x10 to 20x20. Coal is used for fuel in the hoisting works, while wood is used in the reduction works, as it gives better satisfaction. About 600 men are employed in and about the mines.

These deposits were first worked in 1845, and since 1850 have produced over 950,000 flasks or 72,670,000 pounds of mercury.

Hybridish in Mollusca.

The January number of the *Journal of Conchology* contains some very interesting notes on a series of experiments conducted by Mr. George W. Chaster of England. He says as fol-

lows: On April 2, 1898, I received from my friend, Mr. H. E. Craven, two living *Limnaea*, one *L. stagnalis*, and the other *L. auricularia*. Two days previously he had taken them near Litchfield, in the act of conjugation, *L. stagnalis* performing the part of male, *L. auricularia*, that of female. The act was not observed to be reciprocal.

The animals were placed in fresh water, and supplied with aquatic plants, carefully freed from Mollusca. The *L. stagnalis*, whose shell had been much damaged in transit, only survived a couple days; but to my great satisfaction, the other lived and deposited two or three batches of eggs, dying eventually on April 30th. The young emerged from the eggs in about a month's time, and were carefully tended during the summer and autumn. In the winter and spring they were neglected owing to pressure of other work, and but few survived. At the end of June in the present year, these had reached adult age, as was evidenced by the slight reflection of the outer lip, and were killed without having been observed to attempt reproduction. Their shells exhibit some variation, but show no affinity to either parent, for all of their conchological characters are quite unmistakably *L. peregra*.

Now in connection with this case, two points merit consideration. We are at once confronted with the problem as to whether *L. stagnalis*, *L. auricularia* and *L. peregra* are to be considered as distinct forms, or as mere races or sub-species of a single species. Most conchologists, I doubt not, would positively pronounce them distinct, and those attentive and experienced students of the group, would express a doubt. I do not propose to enter into a long discussion upon the value of various morphological differences as data for separating species, but will merely emphasize the fact, that no differences, conchological or malcological, are sufficient to separate two forms as distinct species, unless a sufficient number of observations are made to prove that these differences are constant, and that intermediate forms do not occur to bridge over the distinction. In the case of land and fluviatile Mollusca, with their extremely variable environment, we should expect to find great variation occurring, variation becoming more and more pronounced and permanent until at last races or sub-species are produced which no longer revert back to the primative form, when they are re introduced to earlier conditions of life. (Such races are easily exemplified in *Homo sapiens*.) Too often, unfortunately, does the conchologist ignor the scientific aspects of this difficult problem. Too often does he hasten to describe as a "new species" a specimen presenting some trivial difference from others occurring in neighboring localities. Quite recently I noticed six "new" species of Succinea described from the Sandwich Islands alone, some of them apparently based on characters such as specimens from different localities often present in the case of our S. putris.

The remarkable progeny of the *Limnaea* just described appears to afford phylogenetic evidence of considerable importance. Everyone is of course familiar with Charles Darwin's classical observations on the reversion of the offspring of crossed breeds of pigeons to the primative stock. Have we not here an analogous case? May we not justly conclude that L. peregra represents the primative form from which have arisen L. stagnalis, and L. auricularia, whether these are looked upon as races or species. It seems difficult to escape from such a line of reasoning.

We have printed these observations in full, for we feel they are of considerable importance, and may be the means of some of our correspondents, who have time at their disposal, and an inclination to work out some of nature's secrets, to bring to light some most interesting conclusions. For

some years we have been passing through a decade, that is certainly remarkable and any true naturalist may honestly stop aghast, and say, where will it end. It has been well known for a score of years, that time would not bring forth any really remarkable new forms in this country. But what has been the result. Simply this, that we still continue to print and distribute to the world, a constantly growing list of "species" ranked side by side, with the good and established forms of our older naturalists. Not only this, but there are many cases on record and some very recently, where the older forms that were well established, have been shoved aside, and in their place has two or more "new species" been described with the new and up-to-date author's name attached. Is this right?

We are well aware of the great amount of work now being put forth on the natural history of the United States, but is it being used to the end of ascertaining the true state of affairs, or to make as many "species" as possible, species which sooner or later, with more work in the *right direction*, such as outlined above, will some of these days be set aside, whole bunches at a time.

Is it not time that some of our leading naturalists who have the power to do so, set the example of only admitting as "species" those forms that are absolutely constant, and let all others be ranked as varieties.

We hope that some who read these notes will be incited to put forth efforts to trace the relationships of the Mollusca in their vicinity. If there are any specimens in your section that you feel are "merely hybrids" and not "species," start a line of investigation, that will determine some actual results. Let us not continue to proclaim to the world, endless numbers of "species" on mere external or morphological characters alone.

The Prairie Burrowing Owl.

The Burrowing Owl, also sometimes called the sociable owl, is nine or ten inches long, and has a moderate-sized head, says R. L. Glass, in February *Popular Science*.

The entire upper parts are a light yellowish brown, every feather more or less spotted with white. The under parts are white with transverse bands of reddish brown. It inhabits the treeless regions of western North America, from the plains to the Pacific, and is found in all suitable places in Kansas, Colorado, Utah, Nevada, Nebraska, Indian Territory, Oklahoma Territory, Wyoming, Dakota, Montana, New Mexico, Arizona, Washington, Oregon and California.

They are usually abundant and congregate in large communities, breeding in deserted burrows of quadrupeds, such as the prairie dog, badger, or gopher. It is sometimes called the sociable owl, from the once popular belief that it lives in burrows with the rattlesnake and prairie dog, a belief that is fast passing away, as investigation has proven that they have nothing in common, but that the dog and snake are intruders whenever they enter a burrow that is occupied by the owls. Of course, it is well-known by all who have in the least observed their habits, that in the spring, and again in the fall, they mingle freely with the dogs, flying about all over the colony or dog town, as it is called, not living in any particular burrow, but in any of them, as the occasion may require.

At these times the owls and dogs are on the most friendly terms. But for four months, or from the time they pair for the breeding season, until their young ones are full grown in the fall, they choose some burrow that has been deserted, or perhaps they will forcibly take possession of any that suits them; but as a rule they take those that are at some distance from any that are occupied by the dogs. In these at a suitable place, not over 18 inches below the surface, and all the

way from two to eight feet from the mouth of the burrow, they hollow out a place about 12 inches in diameter, in which they gather a small amount of horse manure, on which the eggs are deposited.

The usual number of eggs found is eight, or nine. The largest number I ever found was eleven, and the smallest was four. When a pair have selected their burrow and set up housekeeping, no dog is allowed to enter it. If it does it is sure to get into trouble with Mrs Owl. I have at different times found dogs wandering about with both eyes pecked out, done I believe by the owls in protecting their nest from them. I have found from experience, while collecting their eggs, that they will fight to protect them.

In selecting the burrow in which they wish to make their nest, they are quite careless about its location; often they will take one that is in low ground or at the bottom of some slope where the first heavy rain that falls will drown them out; in fact it does not seem to make much difference to them where the hole is situated if it is large enough to admit them. Last spring, a pair thought to make their home in a six-inch drain tile that crossed the public road, and in this all unmindful of the constant stream of travel that was passing, just above their heads. They lived their for two months or more, and would no doubt have stayed all summer, had not the heavy rains driven them out.

They are quite tame during the summer or until the young ones leave the nest. While one will remain on the nest, the mate will take its place of observation near the mouth of the burrow, and will allow any one to approach quite near, always looking straight at you, and occasionally bowing in a canny sort of a way, until you came too near. Then, with a few sharp clucks, it will fly a little to one side, or right over your head, making all the time a sort of rasping or clucking noise by the rapid movement of its mandibles together. It will try with all its might to attract your attention and draw you away from the burrow that contains its nest. If you will follow it as it tries to lead yon on, when at a safe distance from its nest it will dart ahead or off to one side to some burrow that is not occupied, where it will alight, and, facing you, will haw several times in succession, and then disappear down the burrow.

If you are in search of their nest, take my advice and do not dig it out, for you will only spend your time and labor for nothing, as I found out before I got my first set of eggs. The young owls rarely come to the surface, or see daylight until they are full grown. Only once in several years have I been lucky enough to see them out sunning themselves, when I came unexpectedly on a pair that had their entire family of nine half-grown scattered about the mouth of the burrow, and unseen by the parent birds. I watched them for some time as they hopped around, never getting more than two or three feet away. When at last they discovered me, they gave a warning cry; then like a flash they all disappeared down the burrow. Many hours I spent in waiting and watching, but I never could get a sight of them again until they came out full-grown owls.

"MR. DOOLEY'S" FRIEND DONAHUE.

How He Won a Victory Over the Archey Road Woman Suffrage Club.

The members of the Archey Road Woman Suffrage Club had been permitted to deposit their ballots in a cigar box, the polls of the Sixth Precinct had closed, and late that night Malachi Donahue appeared before his family with a smile of great content on his face.

"How is the election going?" asked Molly.

"It's goin' pretty well," said Mr. Donahue.

"Are our candidates elected?"

"Not with yer assistance anyhow," said Mr. Donahue triumphantly. "I'm sorry to inform ye, fellow-citizens iv th' Raypublic, that th' iliction officials, bein' me, was onable f'r to count y'r votes. Ye, Molly, ar-re undher age, an' Mrs. Donahue, I regret to tell ye that ye marked yer ballot in such a mussy way that I was obliged f'r to throw it out. So I took th' liberty iv abstracthin' both iv thim, th' female vote iv th' precinct bein' too small f'r to carry downtown, an' I presint thim to ye. Perhaps ye can use thim f'r curl papers. Fellow-citizens, ajoo! I'm goin' to bed, an' if a polisman calls f'r ye in th' night f'r vi'latin' th' iliction laws plaze thry not to wake me up."

Concluding this, the longest speech of his life, Mr. Donahue bowed low and went jauntily to his room.—The author of "Mr. Dooley," in the February *Ladies' Home Journal.*

Notes.

In the death of Dr. Elliott Coues, ornithology loses one of its greatest lights. Copy for a sketch of his life was prepared for our January number, but was inadvertantly left out. Dr. Coues was 58 years old at his death, and for nearly forty years has been an ardent student and writer on the Birds and Mammals of the United States. His work, "Key to North American Birds" has run through several editions and is the standard work of an army of workers.

No. 1 of Vol. 5 of the Iowa Ornithologist, under the new name of the Western Ornithologist, and management of Mr. C. C. Tryon, of Avoca, Iowa, comes to our desk. In the future it will be a bi-monthly, six issues a year, at 50 cents, or 10 cents a number. We have always believed there was a field for a good magazine in the Mississippi valley. Birds are very fond in their migrations of following the lines of great rivers, and collectors in the middle west can surely bring to light matter of great interest to the rest of our country. May the good work go on and Mr. Tryon meet with the success he deserves. The first number contains 30 pages altogether, well illustrated and instructive.

Our esteemed friend, Mr. John W. Daniel, of Lynchburg, Va., and Washington, D. C., contemplates publishing in the very near future a quarterly journal of ornithology. The first number is not out yet, but will probably receive notice in our next MUSEUM.

Prof. A. C. Webb, of Nashville, Tenn., has sent us a copy of his neat little work, "Some Birds and their Ways." For homes and schools. It is not a treatise on ornithology, but simply a collection of sketches giving a life history and description of some of the common birds of western Tennessee and adjoining territory. The descriptions, which are in plain language and readily understood by any young student, are mainly from the author's observations. It is illustrated by some 30 cuts and contains 130 pages. If any of our friends would like a copy, we will send one prepaid for 55 cents.

We should be pleased if subscribers to the MUSEUM in the prominent public museums throughout the country would send us notes on the more important work being carried on in the same, and any contemplated expeditions or original explorations. One of our correspondents sends a copy of the University News Letter from Ann Arbor, in which we note:

SKELETONS IN THE UNIVERSITY MUSEUM

The specimens in the collection of skeletons in the museum of the University of Michigan are being mounted and placed on exhibition. Among the skeletons are those of domestic and wild animals, birds and reptiles, including the skeleton of a camel and of a tamarau. The tamarau specimen is probably the

only one in this country. The collection also contains a large number of skulls. The specimens are displayed in cases in the hallway on the fourth floor of the museum building. They are exhibited against a black background and are neatly labeled.

The Jan.-Feb. 1900 Condor, contains matter and illustrations of particular interest to ye editor. While we very much disliked to apply the editorial sheers, still the temptation was too great, and accordingly page 8, containing excellent half-tones of Mr. W. Otto Emerson, Theodore J. Hoover, Chester Barlow and Donald A. Cohen, and page 9, containing Mr. A. I. McCormick, Frank S. Daggett, Howard Robertson and H. S. Swarth, are duly framed and occupy a suitable corner of our "Den." We hope the next time the Cooper Club give us such an interesting lot of pictures, they will be on a separate sheet, so we won't be tempted to spoil a single number of their valuable magazine. Nufsed.

The Bird-Stone Ceremonial.

Above is the title of a sort of monograph of the "Bird Stone Ornaments," occasionally taken from Indian graves and mounds. It is written by Warren King Moorehead, printed quarto size on fine enameled book paper, contains 31 pages and 53 illustrations. We believe every collector at all interested in ancient Indian implements will want this first installment of a line of monographs, which Mr. Moorehead promises us if enough encouragement is received.

We will send some prepaid for 50 cents in stamps.

W. F. Webb,
Albion, N. Y.

Nature Study.

Schools in all parts of the United States are now taking active interest in the study of Nature in all its varied forms. Not only schools, but magazines are taking it up. *St. Nicholas*, known the country over as the best magazine for young folks, has opened up a new department for Natural History Study and devotes six pages in each issue to the same.

It is under the competent management of Mr. Edward F. Bigelow, for many years editor and publisher of *The Observer* and now editor of *Popular Science*, one of the best magazines of the kind in existence. We cordially wish Mr. Bigelow success with the work.

That Uncle Sam does not demand all work and no play from his sailor boys is developed in an entertaining account of the "Social Life in the Navy," written for the March *Woman's Home Companion* by the popular author, Mrs. Anna A. Rogers, who knows very intimately the life she describes, being the wife of a naval officer stationed at Manila.

Among other unusually interesting articles in February *Outing* is "A Northern Girl's Hunting of a Gaitah," from the pen and pencil of the gifted daughter of Senator Quay of Pennsylvania.

The Russian Ice-hill.

A variation from the ordinary form of toboggan-run is to be found in the Russian "ice-hills." The rigours of winter in Northern Europe practically compel the inhabitants of that region to find some form of amusement with which to while away the dreary hours of those ice-bound months. Hence "ice-hill parties" are now a national institution throughout the Czar's dominions, and very cheery functions they are too. The "ice-hill" itself is prepared as follows: A very high wooden scaffolding is erected, having a rather steep slope from the top to the ground, and is then covered with huge symmetrically shaped blocks of ice placed side by side and constantly

watered until they become one solid smooth mass. This artificial slide is terminated by a long, narrow plain of ice, just broad enough to allow of three sledges passing each other, and of sufficient length to enable a sleigh to run by its own impetus to the foot of the next hill. The hills and runs are usually bordered by fir trees, which are thickly hung with colored lights at night. On the day of the party the guests are conveyed to their host's house in special sleighs, and there supplied with rugs, furs and warm drinks, the better to fortify them against the intense cold. They then proceed to the ice-hills and seat themselves by twos in the long, narrow iron sleds, which are rendered exceedingly comfortable by reason of the quantity of cushions spread over them. Arrived at the end of the descent, a sort of "Musical Chairs" takes place, each gentleman choosing a differeht partner for the return run, and keen is the competition among the men, each of them striving to secure the belle of the party as his companion. A good dinner is always provided by the host, and the post-prandial sport by artificial light is often the most enjoyable, and certainly the most picturesque portion of the whole entertainment.—*Cassell's Magazine* for January.

Death of Elliott Coues:

Elliott Coues, the naturalist, died at Baltimore on December 25, and in his demise American science has lost another of her greatest men. He was born in Portsmouth, N. H., in 1842. His father Samuel Elliott Coues was the author of several scientific treatises of great value, so that Elliott Coues, the younger came naturally to study science. He graduated from the Columbian University in 1861, and from its medical department in 1863, and entered the United States army as medical cadet and was appointed by Surgeon-General Hammond as assistant surgeon in the United States army, retaining that office until his resignation in 1881. His first post of duty was in Arizona and then in Colorado and Illinois. In both stations he investigated the natural history of the region and published several important papers. In 1873, he was appointed surgeon and naturalist of the United States Northern Boundary Commission, which surveyed the line along the 49th parallel from the Lake of the Woods to the Rocky Mountains. After his return to Washington he published, in 1872, his "Key to North American Birds," and in 1874, "Field Ornithology." His reputation as a naturalist now became thoroughly established and he was appointed as secretary and naturalist of the United States Geological Survey under the late Dr. F. V. Hayden. He edited the publications of the Survey from 1876-1880, meanwhile conducting explorations in the west. He published "Birds of the North-west" in 1874, "Fur-Bearing Animals" in 1877, and "Birds of Colorado Valley," 1878. He was ordered by the war department to the frontier, but his services to science was so important that he tendered his resignation and continued his scientific career. He was a member of most of the scientific societies of the United States and many of Europe. He was elected to the chair of anatomy at the National Medical College, in Washington, and pursued some of his favorite studies for ten years, teaching human anatomy upon the broad basis of morphology and upon the principle of evolution.—*Scientific American.*

Colours of Cowries.

To *Knowledge* for December, Mr. R. Lydekker contributes an article upon the colours of cowries, illustrated by a full-page photographic plate. The interesting way in which the shells under consideration change during their growth from a thin-lipped form with a spire, as well shown by a series of skiagraphs in *Science Gossip* for June of

last year, is briefly touched upon; while the alterations in colour, rendered so easy by the hiding of the older by the more recently formed whorls and the application of pearly matter to the outside of the latter, is discussed in some detail.

Mr. Lydekker is unable to throw any new light upon the object served by the colouring of adult cowries, nor does he suggest why the dark longitudinal bandings (which he calls transverse) of immature shells, presumably primitive and laid down by the edge of the mantle, should often be replaced by spots or uniform pigmentation derived from the pallial surface.

Nevertheless, the remarks show that many interesting problems remain to justify a further study of cowries, and the paper affords a useful illustration of the more striking types of coloration. Perhaps the most striking of the spotted series is not dwelt upon, to wit, the form with, for instance, a brown ground colour broken by white spots; the larger of which in turn have a very dark brown dot on their center.

The plate would have been better entitled the markings of cowries seeing that it is not coloured, and it is hoped that it will not be taken as the best that photography can do for the conchologist. One is constrained to say conchologist, for the article ends with an uncalled for outburst against the biological method of studying molluscs. At the beginning of the change for the better about which Mr. Lydekker is not correctly informed, attention was naturally turned to the "so-called animal," our ignorance of the habits of which is so well brought out in the "colours of cowries," rather than to the points in connection with the shells which have been known for generations.

Where Young Amateur Photographers Can Be of Assistance to Science.

BY DR. R. W. SHUFELDT.

Of all the instruments that have come into use in the hands of science during the latter part of the present decade, none of them have been found so universally helpful as has been the camera. The photographic camera, with its modern multitudinous appliances, has made its power felt in the greatest variety of ways in all the departments of science, as in physics, chemistry, mechanics, astronomy, zoology, and each and the rest. But it is not my object to present an historical essay here upon this instrument, nor even to make the attempt to write out all I know about the operation of one, in its details; it is merly my aim to bring a few practical hints before young photographers, and show them some of the new fields wherein, by patience and study, they can put their instruments to very excellent uses. As we all know, the art of photography is now easily acquired, and the producing of photographic pictures a pleasurable and sometimes a profitable employment. Yet how often it is, that we see a young person purchase a first-class camera with its entire outfit, and after coming to be a good photographer, is satisfied at the end of a year or so with having filled a large album with pictures of the country around about his or her place of residence, or groups of friends, and perhaps a few other subjects, when the whole, save the album, is relegated to a corner in the garret. This is by no means a rare occurrence and the end of such enterprises.

I am a working naturalist, and a number of years ago conceived the idea that a good photographic outfit would meet a variety of ends in the course of my labors. A hundred dollars gave me one, and three times that amount of money would not induce me to part with it now. Including all my early failures, more than fifty per cent. of

my pictures, and there have been a great many of them, have been published as illustrations to my scientific papers, and elsewhere.

When one comes to examine the figures of mammals, birds, reptiles, fish, and other forms that illustrate many of our older works on zoology, he can be but struck with the fact how wide of the mark the majority of them are. Indeed, it is frequently difficult to recognize the form of the animal that the artist intended to depict from the drawing he has made of it.

It was along such lines, as well as others nearly related thereto, that I hoped to introduce an improvement into my own designs. So simple are these steps that I feel sure that any painstaking young photographer can acquire and practice them,—and that, too, to profitable ends; to his personal enjoyment in the pursuit; or to the great assistance of others; or even to the advancement of learning; possibly to all of these combined.

A year or so ago I was collecting zoological and ethnological material in Northwestern New Mexico and among many other things captured a great number of tiger salamanders (*Amblystoma tigrinum*), which were sent to biological laboratories all over the world. Now a salamander is a difficult subject to get a good figure of, and there are comparatively but few such throughout the entire range of zoological literature. This was my way of obtaining one with the camera: I fixed a small pine shelf perpendicular to the wall of my study at a convenient distance above the floor. This I covered with a large sheet of clean, white blotting paper, bending it so it hung down over the shelf in front, and likewise extended up over the wall behind. It was held in place by pinning it to the shelf with artists' thumb-tacks. Next placing any long, small object on the middle of the shelf in the place to be afterwards occupied by the salamander, we focus upon it with the camera, a strong light coming directly from behind the instrument. Insert your diaphragm with the smallest aperture, and remove the "dummy" from off the shelf. Now we are ready for the subject, and as it is very difficult to get one of these animals to lie still an instant, I waved over his nostrils, for a second or two, the fumes of a little sulphuric ether, and placed him in position on the shelf. As he recovered from the anæsthetic, he assumed a very natural attitude, and was perfectly quiet, allowing me to make an exposure of two minutes, and the result was I obtained a good working negative. The object of the blotting paper is to give a sharp figure, berefit of all surroundings, and that is one kind of picture largely demanded in zoological illustrations. Of course we *can* have all the grass, stones, and the rest of it that we want, but as I say, that is not the kind of figure desired. The blotting paper usually gives a peculiarly soft back-ground, and dead white in the reproduction made from the negaative.

In nearly all cases such a negative should be *intensified* by the usual method with bichloride of mercury and the ammonia bath. It sharpens all the details of the figures, and makes a better print for the object in view. Now from such a negative a good photograph can be made upon sensitized albumen paper, and from this a drawing can be made. Or any of the photo-engravers, by the various methods now employed, can make an electrotype from this negative, from which any number of figures can be printed. Yet again, you can make a print from it upon plain, non-albumenized, sensitized paper, which figure can be afterwards colored by hand from the original, and then handed to a lithographer for reproduction. Finally, one of the prints on this plain paper, can be delicately traced over by means of one of Gillott's mapping pens (No. 291) and Higgins' American drawing ink, and,

when dry, the print can be submitted to a bath of saturated corrosive sublimate, which removes everything save what you have traced with your drawing ink. The "black and white" figure thus produced can be electrotyped by any of the ordinary methods, at a very moderate cost, and it will make a fair figure to illustrate what the young naturalist may have to say in the journal he suscribes for. Excellent figures of fish may be obtained by any of the above methods, if you will but go to the trouble of constructing a glass tank of clear panes of window-glass, say 10x16, but only an inch or two apart and parallel. In such a tank, filled with the very clearest of water, your ordinary-sized fish will be kept constantly in position and quiet. You can photograph through the double glass and the water, but you must only have the sky behind it for a background. To get an animal life-size you must measure it with a pair of compasses, and compare this measurement with the image on the ground-glass of the camera, after you have finally focused to your liking. Your best stock of patience will be demanded in the photography of living birds. An entire chapter might be written upon this branch of the subject, and then it would hardly be exhausted. The same scrupulous care must be exercised in reference to position, the accessories, the backgrounds, and so on.

A few years since I photographed a living Western Red-tail Hawk in New Mexico.

I selected a rugged pine stump for him to stand upon, and this perch was sharply focused before placing my subject upon it. Further, I secured a horizon; in other words, the hawk is brought out in strong relief against a good sky. It would have been a simple matter to have placed a dead bird under one of his talons, but it was not done; I have figures of owls wherein I have accomplished it. Where no background is demanded, such birds can be photographed in one's study, with a white sheet behind them, and against this conebearing pine boughs, old stumps, and the like, come out beautifully, and elegant figures of many kinds can be reproduced from the negative thus secured. A pneumatic snap-shutter is almost an indispensable adjunct to your camera in the proper photography of birds, as some of them have to be partially hypnotized before placed in position to be taken. Then, as they recover from the effect of this, they dress their plumage, assume a natural posture, and then appear animated. You now watch your opportunity, and secure an instantaneous picture of your feathered subject. In the forest you can often get most valuable negatives of nests and similar objects, all of which are highly prized by the scientific naturalst, and can be used in his work. Large lizards, such as onr "Gila Monster" of Arizona, I have obtained by firmly strapping my camera in such a manner as to have the line of the focal axis perpendicular to the floor, upon which I have placed a sheet of white blotting paper, and then allowed the reptile to walk over it, and as he came beneath the lens, I secured a first-class negative of him In the case of mammals, I have photographs of dead ones, placed in natural postures, so faithfull done that they deceived the eyes of the best experts afterwards.

The field and line of work I have briefly indicated above, is brimful of interest for the enthuiastic young naturalist, and one wherein he will soon find that all his ingenuity will be most amply demanded. As every faithful young biologist should keep his "journal" of observations made afield, and in the forest, or afloat, he will very soon find that his camera will aid him immensely in affording the means of furnishing permanent pictures wherewith to illustrate his remarks, and these in addition to the ones used from which his photo-electrotypes have been selected for printing.

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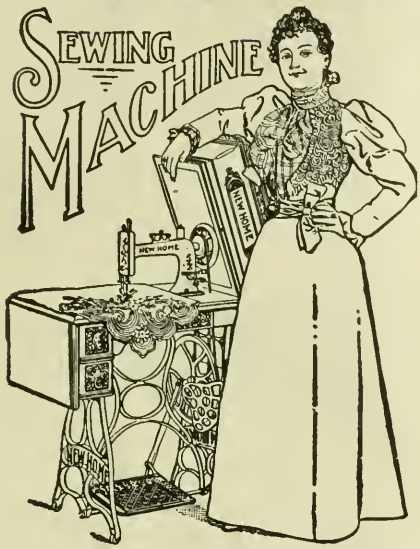

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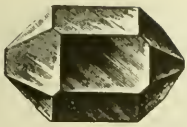

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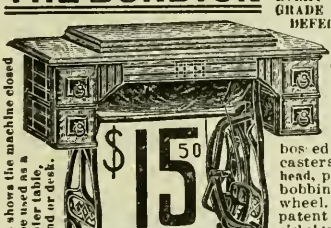

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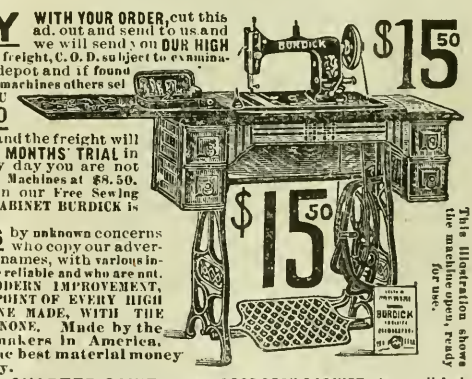

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☞ Beginning with the April number THE MUSEUM will be combined with The Naturalist, Farm and Fanciers' Review, edited by H. W. Kerr, Blencoe, Iowa. It is published and mailed from Albion, N. Y.

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MARCH, 1900.

THE MUSEUM

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Tribute from the South.

[From the New Orleans Times-Democrat.]

Apropos of all this, and other, news from Paris, we take this opportunity to express our admiration of the extremely able and interesting news service from Paris and from London which "The Chicago Tribune" has been running daily in its columns for several months past. Several of the New York dailies have excellent cable letters from London and sometimes other European capitals in their Sunday issues, but they appear as a rule only once a week, the brief dispatches which they get on the other days of the week not amounting to much in the way of an intelligible and adequate presentation of European news. "The Chicago Tribune's foreign service, signed "Grace Corneau" from Paris and "H. J. Whigham" from London, taking it all the week around, is a long way ahead of the foreign news service of any of the New York papers.

One or two of the New York papers have had for years a deservedly high reputation for presenting their readers with news of interest from foreign parts, and the public will not forget its indebtedness to them on that account. But it is beyond dispute that the star of journalism is Westward taking its way, and that the journalism of Chicago is beginning to be the metropolitan journalism of the present, and will certainly be, if things move as they are moving now, the metropolitan journalism of the future. We do not generally, if at all, approve the politics of "The Chicago Tribune," but, apart from its politics, it is, in our opinion, superior to any of the New York papers. Not only is its foreign news service the best in the United States, but its home news service covers the country with a fullness to which the New York papers are strangers. "The Tribune's" edition last Sunday must have caused qualms of envy to the journalists of New York. It was a journalistic effort to which hitherto none of the Gotham papers has been equal.

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All notices that come under above will be inserted in this department until further notice at one (1) cent a word. No notice less than 25c. Terms Cash with order. *No charge for address.* I shall at all times endeavor to keep parties, whose reputation is of a doubtful character from using these columns.

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Our New Catalogue of Supplies is mailed with this. Look it over and save for reference. We cannot now fill orders by old lists. Use the new and be up to date. A new shell list is in course of preparation, for the use of those who like pictures to go by

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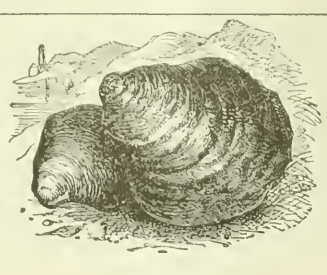

THE MUSEUM.

A Monthly Magazine Devoted to Research in Natural Science.

VOL. VI. ALBION, N. Y., MARCH 15, 1900 No. 5

THE MUSEUM.

A Monthly Magazine devoted to Ornithology, Oology, Mollusca, Echinodermata, Mineralogy and Allied Sciences.

Walter F. Webb, Editor and Manager

Albion. N. Y.

Correspondence and items of interest on above topics, as well as notes on the various Museums of the World—views from same, discoveries relative to the handling and keeping of Natural History material, descriptive habits of various species, are solicited from all.

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Notes.

Mr. Willard N. Clute, of Binghamton, editor of the Fern Bulletin and other journals, is spending the spring in Jamaica.

Mr. H. W. Kerr and wife, of Blenco, Iowa, visited the MUSEUM office recently. Mr. Kerr is the editor and owner of the Naturalist, Farm and Fanciers' Review, a spirited monthly publication devoted to the interests of the topics indicated in its name.

The quarterly journal of ornithology, to be edited and published by Mr. John W. Daniel, Jr., of Lynchburg, Va., Washington, D. C., et. al., does not seem to appear very fast. It was apparently on the verge of appearing some two years ago, but Mr. Daniel was called to war, and the time of publication was deferred. What the reason is now no one seems to know. From all we can learn the journal is being backed very largely by wind, and is liable to be blown away before it fairly gets started. Our subscribers will do well to be careful.

Our little check list of the land shells of North America seems to be very well received, both in this country and abroad. Many flattering letters have been written us by the prominent collectors in this country and abroad, fully a thousand copies having already been ordered. It being the first time such a list has ever been published in this country, in a small, neat and convenient form for enclosing in letters, and the fact that all species are priced as accurately as was possible to judge of their value relatively and collectively, by our best authority, it is little wonder that it is thoroughly liked and appreciated. Other check lists of the American Strepomatidae and of the Unios may follow during the year. Suggestions in regard to same will be very thankfully received from our patrons.

The time will soon arrive in our northern states for the collecting of our land shells, as it is already well under way in the south. Collectors who will give some time to this branch of natural history this season, may be surprised at the results obtained. Careful attention should be given to the small and very minute species. Send us samples at any time for verification, and if we cannot satisfy ourselves as to their correct names, we will submit

them to other and better authorities. We shall be pleased to assist any one who will put some time into this. Collectors in Colorado and other eastern Rocky Mountain states are particularly desired to look for the minute Pupa's Bifidaria, etc We shall be pleased to exchange specimens in any line of natural history for what you collect

Among the Lower Invertebrates.

The lower forms of life in the ocean always attract the attention of naturalists, mainly because of the trouble and work of getting them, and the fact that so few are found in the average collection. About all that are ever seen are a few dried starfish and Urchins, but many of the more delicate forms must be preserved in liquid. Formerly alcohol was the only medium used to any extent and the result was that specimens were expensive. Now that formolin has come into general use and the fact that it is quite inexpensive, collectors are adding many of the more curious and lower forms of life. For a very small amount quite a large collection can now be secured.

Among the *Porifera* or sponges, one of the more common forms is *Chalina oculta*. This is a bushy form, occasionally found on piles of rocks. It is transparent and is commonly called Dead-man's fingers. It is usually found where there is a considerable current of clear water. If the conditions are favorable for growth, it will attain a height of two feet. The *Grantia* belongs to another sub-order as also does *Microciona prolifera*, which is sometimes found along Cape Cod and Long Island Sound. It grows in the pools and tideways. When in still water and on a smooth surface, it forms a thin smooth sheet, but under other conditions it tends to grow upright, and form branching masses a few inches in height. It is of bright color and produces rich effects when much of it is present *Cliona sulphurea* belongs to another sub-order of the sponge family, a group which has accustomed itself to a life of borers. While they do not attempt to bore into hard rocks, they are quite destructive to the shells of various mollusks, and even to limestone and marble. This sponge penetrates and excavates chambers in the shell of a mollusk, and then after causing the death of the animal, it will entirely enclose and resorb what is left of the shell. Not content with this, it frequently proceeds to grow around stones, or take them in until its flesh is full of such ballast. Sometimes this form is found attached in the usual manner, and when the locality is free from stone or sand, the specimen is clean and free from such incumbrance *Leucosolenia* belongs to a class of fine tiny sponges that grow in clusters. Very curios form. *Suberites compacta* belongs to the same order as *Cliona* and is the only form in the vicinity of Cape Cod that is able to live on the shifting sands. The pores are so small and the structure so dense, that the sand cannot obtain an entrance, while its lightness keeps it from being buried. They are frequently washed ashore in considerable numbers.

Among the great Hydroid group are found many interesting forms on our eastern coast. *Companularia* is a good form for illustrating. It grows in small tree-like forms on the rocks. *Pennaria tiarella* also grows in tree-like masses in small colonies. This specimen with *Gonionemus vertens* are two of the most interesting of their kind. As stated above the Pennaria to all appearances is a small tree, and has every form of one, but it is not classed as a plant at all but is really an animal. As positive proof of this, all over its surface are small feathery masses, which are in process of development like a rose In due time if not molested these would have fully developed, and by its own action, freed itself from the original stem and floated off in the water a free swimming live animal, so commonly called "Jelly

Fish." The *Gonionemus vertens* is a most beautiful specimen of the small Jelly fishes, about ¾ of an inch in diameter. It looks like a small umbrella, with tiny streamers hanging from the edge. Is perfectly transparent. These little tree-like forms puzzled naturalists for many years until they were transferred to salt water acquaria and studied, when the above astonishing result was discovered. It furnishes a very good connecting link, as it were, between the animal and vegetable world. *Dactylometra quinquecirra* is the more common form of Jelly fish seen sometimes at twilight in immense numbers floating over Long Island Sound and adjacent waters. Owing to its large size it is not sought after so much as specimens, as it takes at least a quart can to show off one nicely, and they are frequently a foot in diameter. *Metridium marginatum* is one of the handsomest forms of the beautiful Sea Anemones, the roses of the ocean. These handsome little animals attach themselves to the rocks, have a trunk like a mushroom, and the top blossoms out like a rose. To preserve them and still have the "top" blossomed out is a delicate task, for the moment you touch one in the water it closes up rapidly and nothing but a short stump is left. They have to be collected and placed in pails of sea water when they very soon open nicely. Then a small quantity of formolin is added and after a day a little more and in this way they are at the end of four or five days thoroughly inoculated with the formolin and die, fully expanded It is a tedious job, but will repay the collector.

The *Echinodermata* include a wealth of larger and varied forms. The *Asterias vulgaris*, our most common starfish of the Atlantic coast makes a pretty specimen when preserved in formolin and fully expanded. *Echinarachnius parma*, the Sand Dollar and *Arbatia punctulata*, the pretty little black spiney Sea Urchin are most commonly preserved dry. They make pretty specimens. *Ophiura olivacea* is frequently called the Serpent Star and is best preserved in formolin, owing to its delicate form and fragility. Their tiny arms quite resemble small snakes. *Thyone briareus* or Sea Cucumber is a specimen not so commonly known. It belongs to the curious order of Holothurians, lives just below low tide and found occasionally all along our Atlantic coast. They run from 2 to 3 inches long, but the alimentary canel is about seven feet long, although the oval stomach is less than one inch. They are black, bushy, pear shaped, with tentacles at the top, that can be quickly and deeply retracted at any time.

Deep Sea Mollusks and the Conditions Under Which They Exist.

An address by Wm. H. Dall before the Biological Society of New York.

I propose to lay before you a statement of the conditions which characterize the life of Mollusks in the Deep Sea, so far as they are known to us, and to discuss briefly the effect of these conditions upon the animals subjected to them; the contrast which their life presents to that of shallow-water mollusks; the peculiarities observed or the modifications induced by the special environment; together with some notes on interesting or remarkable forms discovered in deep water.

Once for all, it must be understood that explanation of the deep sea fauna has only begun; that the area swept by the trawl and dredge compared with that which remains unknown, is almost infinitesimal; and, of the material secured by dredging, a large part is fragmentary and imperfect In short what we know about the deep-sea mollusks can only be regarded as a foretaste of that knowledge which future years may be expected to supply.

In all addresses of this sort bibliographical references would be out of place. I will only say that the liter-

ature on the subject is almost wholly confined to the publications of the last twenty years, and consists in large part of the reports by various specialists on such voyages as those of the British vessels, *Lightening*. *Porcupine*, *Valorous* and *Challenger;* the French *Talisman* and *Travilleur;* the Norwegian, North Atlantic Expedition; and the expeditions of our own Coast Survey, Fish Commission, and Navy, on the *Blake*, the *Fish Hawk*, the *Albatross* and other well known vessels. The most distinguished naturalists of this country and of Europe have added to their reputation by the investigation of wonderful fauna revealed by these explorations. The most extensive and important single series of Scientific Reports ever published as the result of a single expedition are those which bear the name of the Challenger upon their capacious covers. Next to these come the Reports of the United States Fish Commission, under the leadership of Prof. Baird, and then follows a host of minor documents which it is impossible to enumerate at the present time.

What I have to present to you is rather a discussion of conditions and principles than an exhibit of particular facts or observations.

In order that their existence may be maintained the abyssal mollusks require oxygen to ærate their circulation, food to eat, and a foothold upon which they may establish themselves. It is necessary that the conditions should be such as will not prevent the development of the eggs by which successive generations are propogated, and that they do permit it may be assumed from the very fact that mollusks in large numbers have been shown beyond all question to exist on the oceanic floor wherever this has been explored.

Formerly when dredging with the usual appliances in small boats, one hundred fathoms (six hundred feet) was considered extremely deep. If one stands at the foot of the great Washington obelisk and looks up, the idea of collecting a satisfactory representation of the insects and plants on the ground at its base by dragging a six foot trawl or dredge by a line let down from the apex of the monument, strikes one as preposterous. Yet the monument is less than one hundred fathoms high. Multiply this height ten or fifteen times, and the idea seems, if possible, still more unreasonable, yet it is a fact that successful dredging has been done from a height above the sea-bottom, of not less than twenty-five times the height of the Washington monument. Living animals have been secured from a depth of about two and a half miles.

It is therefore evident that in speaking of dredging, we must revise our terms and define them so as to conform more nearly to the new conditions under which such work is done.

The waters immediately adjacent to the shore were long ago divided by Forbes and other pioneers in marine exploration into zones or areas according to the conditions characterizing them; for instance, the Lammarian zone or region of brown kelp, the Coralline zone or region of stony algæ, etc. But for general purposes and to contrast the areas of the whole sea, one with another according to their chief characteristics, we may now divide the entire sea bottom into three regions.

The first is that to which the light can penetrate and therefore where marine vegetation can exist. This is the Litorial region, and in a general way, modified by especial conditions at particular places, it may be regarded as extending from its actual shore out to the limit of one hundred fathoms. Beyond this it is practically certain that no light reaches the bottom of the sea and no sea weeds grow. Outside of this the borders of the continents slope gradually to the bottom of the ocean, which is found usually at a depth of about 2,500 fathoms.

On the upper parts of these conti-

nental slopes the conditions are often very favorable to marine life. Currents of comparatively warm water, like the Gulf Stream, sweep along bringing fresh pure water and supplies of food to the animals along their track. The differences between the abysses and the slopes is rather a matter of temperature than of mere depth. But the temperature itself is somewhat dependent on the depth, the influences of the great warm currents rarely extending below seven or eight hundred fathoms and this depth corresponds roughly to a temperature of about forty degrees Fahrenheit. Below this it diminishes as the depth increases, at the rate of about one-tenth of a degree to one hundred fathoms until the freezing point is reached, though there is no reason to suppose that the abyssal water ever actually becomes congealed.

To this cold dark area of the ocean bottom has been applied the name of the Benthal or Abyssal region.

To the region, chiefly on the contidental slopes, between the Litoral and Abyssal regions, I gave some years ago the name of the Archibenthal Region.

These divisions have been recognized by various writers and have had several terms applied to them. Those I have mentioned seem to me as characteristic as any, and in some respects more convenient than any I have heard used.

Let us now consider the conditions under which life exists in the Abyssal and Archibenthal regions. It may be premised that the differences between them are largely of degree and not of kind and do not require that the two regions should be considered separately.

The chief characteristics reside in the composition of the sea water, including its contained gases; in the dynamic status of the deeps, especially in relation to temperature and pressure; in the mechanical qualities of the materials of which the oceanic floor is composed; and lastly, in the food supply.

As determined by physicists and chemists the water of the deep sea varies in the properties of natural salts, carbonic acid and air contained in it very much as does the surface water. In general at the surface the warmer water of the tropics has the more salt and the less nitrogen. When carried by currents to the Polar regions and cooled, this tropical water sinks to the bottom carrying its excess of salt along with it. The Polar waters are less saline and contain more nitrogen. The proportion of atmospheric air in the water is found strictly related to the temperature, the pressure at great depths being regarded as having no bearing on the question. The amount of oxygen in the sea water diminishes gradually as we descend from the surface until about 359 fathoms is reached, when it ceases to change or at most increases slightly until the bottom is attained.

Carbonic acid, according to Tornœ, does not exist in a free state in sea water, but only in the form of carbonates or to a less degree of bicarbonates. Unless the decomposition of animal matter in some manner sets free the carbonic acid, this conclusion is one which cannot be adopted without question, especially when we consider the great difficulties which are encountered in any attempt to obtain, or when obtained to analyze abyssal water. . The effect of erosion on the shells dredged, from the deeps, even when they contain the living animal, is so strongly marked, the devices for protection against erosion are so recognizable in various species, that the biologist may well call the physicist to a halt, while the latter re-examines his data. It is certain that erosive agencies, of which the effects are indistinguishable from those known to be due to carbonic acid in other instances, are extremely active in the deeps.

In general it seems as if we might

safely assume that the composition of abyssal sea water shows no very important differences from that of other sea water and that the animals existing in it are not exposed to any peculiar influences arising from this source alone.

This cannot be said of the physical conditions. Everyone knows how oppresssve to the bather is the weight of the sea water at only a few feet below the surface, and how difficult it is to dive, still more to remain on the bottom, if only for a few seconds.

But it is difficult to convey any adequate idea of the pressure at such a depth as 2,000 fathoms, or about two miles below the surface.

Rope made impervious by tarring is said to have become reduced one-third in its diameter by a descent into these depths. Any hollow object not pervious or elastic is at once crushed. There is no doubt that at some points on the ocean floor the pressure may amount to several tons to the square inch.

If we recall that the average pressure in steam boilers is probably much less than one hundred pounds to the square inch it may help toward an appreciation of the abyssal conditions.

The inevitable conclusion is, therefore, that all the animals living under these conditions must have their tissues so constituted as to prevent the free permeation of the water through every part in order that the pressure may be equalized. How that is possible without putting an end to all organic functions is perhaps the greatest mystery of abyssal life. How can a large egg, like those of various deep-sea animals, pass through the stages of segmentation and development, with every mollecule of its structure in actual contact with ordinary sea water and every solid particle subjected to a pressure of say a thousand pounds to the square inch?

(To be continued.)

The Harriman Alaska Expedition—A Small Talk About Glaciers.

Chief among the objects of interest in Alaska are its stupendous glaciers. To more than one traveler the sight of these has made real for the first time all that he has read of the enormous power of such rivers of ice and the influence that they have exerted in earth sculpture.

We are accustomed to think of the world as changeless, of the hills and mountains as immutable, and of earth and sea as being of all things the most lasting. Yet in fact we know that this is not true, that all over the world change is constantly taking place, that volcanoes spout out lava, increasing the size of mountains; that snow and water and frost are constantly tearing off or breaking away fragments of other mountains and carrying them down toward the plain; that the thundering waves of the sea are continually breaking upon the shore, removing it in one place and adding to it in another; and that for the last few centuries man, with his axe and his grubbing hoe and his plow, is altering the face of the earth, enabling the rain and the brooks and the rivers to pick up and carry away the soil, which is at last transported to the ocean and tends to fill it up. Instead of being permanent, therefore, the earth which we inhabit is unstable. The elements in their ceaseless action, the earthquake at intervals, and man during the short time that he has inhabited it are changing its surface continually.

We know too that in very ancient times the face of the land which we inhabit was very different from what it i now. The mountains were higher, and so the valleys deeper. Great areas of the land, now mountain and plain, fertile farm, arid stock range, or peaks only traversed by the wild animals, were once the bottom of the salt sea. And in the earth or the rock over which we now pass are often seen the bones or shells of the marine animals which

were born and lived and died and were covered up in these ancient times, to be seen by us to-day as stones which have the shape of animals.

These high mountains have been cut down by the action of the elements; the valleys in part have been filled up, and this ancient sea bottom covered by soil which was once a part of the tops and sides of these mountains. This work has been going on for all time; it is going on to-day, and it will continue to go on.

One of the most potent agents of this denudation was ice, although the length of time during which this agent has acted is small by comparison with the age of the earth. Over much of this continent it has now almost ceased to act, yet in the furthest north it is still doing the work which once it did over the whole of the northern North America.

That division of geological time in which mammals had their greatest development is called the tertiary period. And it was during the ages which immediately followed the close of that period that the whole northern North America was covered with an enormous ice sheet thousands of feet in thickness. Beneath this frozen mass were deeply buried the whole of British America, all of New England, a very large portion of the Middle States and much of the Rocky Mountains. In northern New England the upper surface of this ice sheet was at least 6,000 feet above the sea level, while it is estimated that still further north it was not less than 13,000 feet in thickness. This vast mass was not, as might be thought, at rest. Instead, it had a general slow, but more or less constant motion southward. This was the only direction in which it could move, because to the south the ice was constantly melting and disappearing, while to the north it was always firm and unyielding, and tended constantly to increase in thickness, and to push away a portion of the mass in the direction of least resistance. This pressure was constant and ever increasing, and urged on by it, the ice sheet moved steadily southward, creeping up high mountain slopes, and then, when their summits were reached, overtopping them and pushing its way down on the other side.

It is a matter of common knowledge that ice is to a certain extent plastic; in other words, it can be made by pressure to take certain forms, as wax does, though of course it is not soft like wax. Dr. Kane speaks of a table of ice 8 feet thick and 20 wide, supported only at the sides, which in two months' time, while the temperature was constantly below the freezing point, became by its own weight so deeply bent that its center was depressed 5 feet. By pressing ice through a round hole it may be made to take the shape of a long cylinder, or ice by pressure may be made to copy a seal or a mould. This being the case, we may understand how this great ice sheet moved forward, adapting itself to the inequalities of the land, filling up valleys, climbing mountain sides, overtopping them and then flowing down beyond them. The motion of the ice sheet was slow, but it was sure. It flowed onward slowly, as molasses would flow on a cold day, but better still, is the illustration employed by Prof. Dana, who says: "If stiff pitch be gradually dropped over a horizontal surface it will spread and continue to do so so long as the supply is kept up, and if that surface rises at an angle in one direction and there is no escape in the other, it will first fill the space to the level of the edge and then drop over and continue onward its flow. So glaciers, if the accumulation is adequate, may go across valleys and over elevated ridges."

It may be asked where did all this ice come from and how did it accumulate to the enormous thickness already named? The answer is simple: It is the accumulated excess of the precipitation of many ages over the annual melting. The ice of the great ice

sheet of the glacial period was merely compacted snow, and the climatic conditions were such that each season more snow fell than was melted, and so the ice sheet grew.

If the winter's snow fall is 60 inches and the rummer is so cool that of this snow but 50 inches melts, the ice upon which the snow falls will receive an annual increase of thickness to the amount of 10 inches of uncompacted snow, a very slight thickness. If the ice sheet to-day does not cover any considerable portion of the country in which we live, it is because the summers are so long and warm that the snow and ice melt fast, and that for this reason the edge of the ice sheet has crept further and further to the north, so that now on the continent of America it no longer exists, except that on some high mountains and in the north, fragments of it are left in the glaciers found there and in ice masses now covered with soil, which often bear luxuriant vegetation. Such remnants are found only in high northern latitudes or on lofty mountains, where the melting of the ice in summer does not greatly exceed the snow fall of winter. The grandest well-known glaciers of the temperate zone are those of Switzerland, but one must travel to the Arctic to witness the most stupendous exhibitions of their work.

Glaciers are simply rivers of ice, of varying thickness and extent, having their origin above the level of the perpetual snows by which they are fed. Though in its origin a glacier consists merely of compacted snow, this snow, as it advances down the mountain side, is gradually changed by pressure into an ice-like mass, and as it reaches the point where there is alternate melting and freezing, it becomes true ice. The glacier tends constantly to move in the direction of the least resistance, and follows the inequalities of the ground, thus moving in a bed not unlike that of a river. Yet as the momentum of such an enormous mass is almost inconceivably great it acts as an enormous plow, which cuts a furrow both wide and deep. In its course, it scrapes away the surface soil and the loose stones, and reaches down to the bed rock, against which it continually grinds and wears itself away. In its course it picks up and carries away with it gravel, pebbles, boulders and sometimes great masses of rock, and these, whether torn away from the sides of its bed or dropping on the ice from overhanging cliffs, are lieely at last to reach the bottom of the channel which it has made. Here they are rolled along, crushed beneath the mass of the ice against or into the rock over which it is passing, which is thus scratched and scored or has its irregularities of surface smoothed and planed off or sometimes is highly polished. In glacial regions such surfaces are frequently seen, as well as the smoothly rounded knolls of rock called sheep backs or roches moutonnees. Such surfaces exist over much of northern North America, though usually covered up by earth and vegetation.

The debris carried along in and against the glacier is constantly being ground up like the grain between two mill stones, and the water of the stream formed by the melting ice is charged with this pulverized rock. Such streams therefore are milky fn color, and can often be recognized by this character far away from their source. On either side of the glacier and at its lower end—if it does not reach the sea—and often in the middle of it, are great heaps or windrows of sand, gravel, stone and great rocks, which have been pushed before it or to one side by the ice mass as it travels along. These accumulations of glacial debris are called moraines, lateral, terminal or medial, according to their positions.

Although a glacier is, in fact, a river of ice, it acts very differently from a river of water. Thus the cross profile of the stream valley is shaped like a V, while in the glacier valley the same profile is like a wide U. The curves

of the stream's course are irregular, sharply bending from side to side, as any one may see who looks down from a height on the course of a river flowing through the valley. The curves of an ice river, on the other hand, are slow and sinuous, and the mass changes its direction very gradually.

It was about noon when the ship entered the Muir Inlet, and steamed along toward the great glacier at its head. Icebergs soon began to appear; at first small, later much larger. Some were pure white, others dirty; others white above where they were partially melted, and beneath a beautiful blue. The light falling through the ice gives this color, and it is reflected back from the water in the purest, most delicate sea green.

The Muir Glacier, which we were now approaching, is rapidly receding Twenty years ago its front stood two miles further down the bay than now, so that to-day ships sail up over nearly two miles of water, which was formerly occupied by the ice. The front of the tremendous glacier, which was the first that we had seen near at hand, is two miles wide and perhaps 200 feet in height. From its face great bergs break off at frequent intervals, and fall with a tremendous roar into the water below. They are deeply submerged, spring out of the water again, so as almost to clear it, go down again, and so rise and fall many times, and at last, after reeling and bobbing about on the surface find a point of equilibrium and slowly float away, to travel back and forth with wind and tide until they melt. As the water melts them below faster than air and sun do above, they are dangerous to approach in a small boat, since one can never tell when they will turn over and split in two. As they grow small first beneath the water there is often considerable overhanging ice, which gives some indication of their age. The turning over of one of these bergs agitates the water, producing waves which may cause other bergs in the neighborhood to upset.

While the party were near the Muir Glacier an immense mass fell from its place, representing perhaps one-quarter the width of the glacier—that is to say, it was a mass of ice half a mile wide and from 200 to 250 feet in height above the water. How thick it may have been no one can tell. When this fell the wave caused was tremendous, and obliged members of the party who were on the beach to run to higher ground to escape being washed away. As the mass fell it split into three great pieces, one of which floated off, the other two remaining grounded. One of these masses sprang back out of the water, nearly or quite to the height of the glacier. The roar of the fall was appalling.

One day two of the party were close to the glacier in a canoe when a great mass of ice, coming apparently from under the glacier, shot up out of the water and raised a wave which nearly filled the canoe and ruined all their photographic plates. If they had not been expert canoemen the two men would very likely have been upset and drowned, for in this ice cold water a man would not long survive. This mass of ice was so close to them that fragments of the berg fell all about them, and any one of these, if it had struck the canoe, would have wrecked it. The experience was one of great danger.

From the midst of the Muir Glacier rises a huge nunatak or mountain of rock, a real island in the sea of ice. Many years ago, it is said, that only the point of this mountain was to be seen above the surface of the glacier, but now it is nearly 700 feet above the ice; in other words, the glacier was then 500 feet thicker than now, and its slope of course much more steep.

At various points on this glacier are found curious cones of ice, each capped by a number of hard quartz pebbles, spherical, or nearly so, and so smooth that they sometimes seem polished. Such pebbles have been ground

in a glacial pothole, the softer rocks which were with them being ground to powder and carried away by the water, so that only the harder ones remain. The surface of the glacier gradually melts until the bottom of the pothole in which these pebbles lie is even with the top. Then the pebbles protect the ice immediately under them from the direct rays of the sun, and prevent it from melting, and as the surrounding surface melts they remain on this unmelted ice, which now forms a conical projection above the surface of the glacier, the top of the projection being what was formerly the bottom of the hole.

Not far below the Muir Glacier, and on its wide side, a stream has cut its way through an enormous mass of morainal detritus, carrying away the gravel and revealing the still standing tree trunks of a long buried forest. At first thought it might be imagined that the sweeping down by the glacier of the enormous mass of coarse gravel would have uprooted or broken off and overthrown the trees of this ancient forest, and that when again revealed by the cutting away of the drift, all its trunks would have been found prostrate. The reverse of this is true, however. While there are many fallen trunks, most of them are still standing, though usually broken off at a height of from 10 to 25 feet above the present level of the stream valley. This, of course, shows that the forest was not in the direct path of the glacier, but was to one side, and that at first the encroachment of the morainal drift on the standing forest was very gradual, and the process of covering it up very slow. The gravel of the moraine was pushed over little by little into and upon the area covered by the forest, the glacier acting as a plow acts, and pushing out of its way and off to one side the loose material, which at length covered up the forest. Until the gravel had been deposited to a very considerable thickness the moraine's advance was not so rapid as to overwhelm the standing trees. Instead of that, as it was deposited about them gradually it soon became an absolute protection to the trunks, at least to the height to which they were wholly covered. The details of the burial and subsequent uncovering of this forest will no doubt ultimately be told by the geologists and botanists of the expedition.

The day after leaving Sitka the ship followed the coast, at first about twenty miles distant, but later it ran in much closer, in order to look at a great glacier which comes down from the Fairweather range to meet the sea, and which on the coast survey chart is called La Perouse

This glacier has a front three miles wide Its northern half seems white and new, and to be moving, while the southern half appears old, dirty from melting, and dead. Under the new ice for almost the whole width of the front, old dirty ice can be seen, and the impression is gained that a new and active glacier is flowing over one that is old and dead. On either side of the glacier's front the beach shows, and it is apparent that the ice here is moving over the more or less level ground, and not through a channel that it has cut out.

In one of the lifeboats a party landed through the surf, which was rather high, though not really bad, and in doing so got pretty well soaked by surf breaking behind the boat. A small skiff that was being towed was tossed about by a combing breaker and pounded on the beach so hard that one of its sides was split

From the moraine at the side of the glacier a portion of its surface could be seen, split in every conceivable direction, and broken up into a bristling mass of sharp pinnacles from 15 to 40 feet high, over which it would be impossible to pass. At one point at the side of the glacier was a deep cavern under the ice, green and blue, and dripping from a thousand points so much water as to feed a small stream that flowed from it.

After an hour or two spent here, the party returned to the beach. It was determined that three men should go off in the skift, to lighten the load of the ship's boat. The surf was passed without difficulty, but before the skiff had gone far it was seen that she leaked so that the men must return to the shore at once or sink. All had prepared for a swim by removing their boots, but the beach was reached before the boat sank. Just as all hands were about to spring out and run the boat up beyond the waves, a breaker broke beneath the stern, lifted it high, struck the boat's nose into the sand, and unceremoniously dumped out the passengers The large boat was then launched with no more serious disaster than shipping a few barrels of water, and the ship was reached again without trouble.—G. B. G. in Forest and Stream, March, 1900

Winter Botanizing.

In the early years of my botanical experience, says Wm. H. Rich, in December Rhodora, October brought to a close the collecting season, and with the appearance of the Witch-Hazel flowers I thought it useless to continue further exploration. As the Hepatica was to me, in those years at least, the first flower of the year, so the Witch-Hazel was the last. These two species marked the beginning and the end of my botanical calendar For eleven years my note-books show no date later than October 22, but as the seasons came and went subjects of alluring interest presented themselves, gradually extending the botanical year at both ends, so that now to quote a sentence from Thoreau, "You cannot say that vegetation absolutely ceases at any season in this latitude."

The late E. H. Hitchings of interesting memory has recorded the fact that "the wild flowers even in this cold region, blossom every month in the year," adding in proof of his statement that he had found the Hepatica in flower from September to May, nine consecutive months. Somewhat surprised as well as interested by these statements, and with a desire to know for myself the extent to which our plants are found in flower during the winter months, I have during the past few years noted all such as I have seen or that have come to my notice through other observers. It is not of course intended in this article to include cryptogamous plants, such as mosses, lichens, fungi and algae, many of which, indeed, attain their fullest development more abundantly in the winter than in the summer months.

That wild-flowers bloom all the year round in New England, though literally true, is a statement obviously to be taken with many qualifications, and it may be remarked that the smallest botanical box will be sufficiently large to hold all that may be found during the months of January and February. The two months just mentioned are, however, the only ones in which flowering plants will be found at all scarce.

Beginning with November let us briefly review the floral conditions existing in eastern Massachusetts during the colder months of the year. In this month plants in flower are so numerous as hardly to excite comment. On a recent excursion, November 13, fifty-one species still in flower were recorded, and the list might easily have been enlarged by further search.

In December during the earlier part of the month, should the ground be free from snow and the weather mild, as is frequently the case in this region, numerous plants still lingering in flower can usually be found without much effort. In that delightful sketch, "December out of Doors," by Bradford Torrey, occurs the fullest list of December flowers that I have yet seen. He records the names of sixteen species, and to that number I have thus far been able to add but three others, as follows: Hepatica (*Hepatica triloba*, Chaix), recorded by E. H. Hitchings; Common Dandelion (*Taraxacum offi-*

cinale, Weber); Seaside Golden Rod (*Solidago sempervirens*, L.) The Golden Rod I found as late as December 22, at Revere Beach, Mass , in fine fresh flower, though with blackened and shrivelled leaves.

The record for the next two months, January and February, though meagre, does not lack its representatives In January there have been found in flower the Hepatica, E. H. Hitchings; Knawel (*Scleranthus annuus*, L.); Groundsel (*Senecio vulgaris*, L), Bradford Torrey; Chickweed (*Stellaria media*, Cyrill); and the Dandelion. On the 18th of this month in 1899 the Dandelion appeared in full bloom on a grassy bank at Chelsea, Mass , in such numbers as to attract public attention

In February my list records the Hepatica, E. H. Hitchings; Chickweed, concerning which Thoreau remarks "apparently it never rests;" Skunk Cabbage (*Symplocarpus foetidus*, Salisb.), Frank Bolles; Dandelion; Mayflower (*Epigaea repens*, L.), a small bunch of which I received from Orleans, Mass., that was collected in full flower February 12, 1899, and on the same day my informant adds that some Strawberry plants in his garden were in bloom. The Dandelion, it may be said, has been found in flower every month of the year. Willows in staminate flower are occasionally met with in January and February, but owing to the difficulty of identifying the species they are not included in the lists.

I have confidence that the scant record for these two months can be increased as future opportunities offer for more extended observations, and doubtless some of the readers of Rhodora may be able to add to the number.

March, though sometimes in New England one of the severest of the winter months, offers so many plants in flower, especially toward the latter part, that a list of them would not be of especial interest.

There is other and more important work, however, in winter botanizing, than the mere enumeration of such chance flowers as a mild season may offer as a reward for the botanist's constant attention. Many fruits of trees and shrubs can now be collected and studied with better advantage than was possible earlier in the season. A hitherto much neglected subject for study is that of the winter state of our trees and shrubs. one to which increasing attention is now being given. It is surprising how few of them can be readily recognized by even the most competent botanist, and the collection and study of specimens of bark, twigs, and buds in their winter state will be found full of interest. The complete herbarium must show specimens of these in addition to leaves and flowers.

Another subject for study in winter botanizing is the observation of the radical leaves and basal shoots of herbs, some of which differ so much at this stage from those which we are accustomed to associate with the plant as to be very puzzling, and furnish material for collecting on many a winter walk.

While engaged in his occasional winter outings, in these and other kindred occupations, the botanist will soon have his attention attracted to other objects of most fascinating interest. On the lowlands, as he passes along on a sunshiny day in late February and March he will suddenly see, in the gleaming olive of a row of Willow shrubs and in the brilliant red of the Blueberry bushes, on a rocky hillside, signs that will remind him of the approach of another season, and as he stands upon the threshold of a new springtime, before he becomes engulfed in its rising tide of life, he would linger yet a little longer in the enjoyment of the winter's offerings.

An Alaskan Indian Relic.

A totemic column from southern Alaska has been presented to the museum of the University of Michigan by Leon J. Cole, assistant in zoology, who

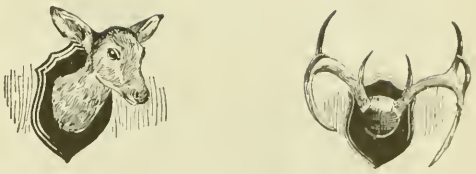
visited Alaska during the summer of 1899 as a member of the Harriman Alaska Expedition. The column is about ten feet high and three feet wide and is made from a tree trunk split lengthwise. It was taken by Mr. Cole from the interior of a house in a deserted village of the Tlingit Indians near Cape Fox. The column was in front of one of the posts which supported the roof.

The carving and painting represent a bear sitting upon its haunches and grasping with its fore paws the arms of a man, the lower part of whose body has disappeared into the animal's mouth.

Besides its obligation to Mr. Cole, the University is also indebted to E. H. Harriman, the founder of the expedition, for his generousity in meeting all expense of transportation of the column from Alaska to Ann Arbor.

Eggs of Insects

The collection, preservation and examination of the eggs of insects, will afford interesting recreation. Curtains, carpets, floor-crevices, cushions, furs and wollen garments will serve as a prolific hunting ground indoors; while out of doors the surface waters of ponds and water-butts, the corpses of birds, the skins of cattle, and the leaves and branches of the shrubberies give an abundance of material. Among those insects whose eggs make the most interesting microscopical mounts may be noted the common house-fly, the wasp, the tortoise-shell and the cabbage butterflies, the mottled umber and the puss moths, the dragon-fly, and most of the prarasites. The eggs of these are of all shades hexagonal, conical, oval, spherical, and are most richly and harmoniously colored; while the elaborately sculptured surfaces are hardly excelled in the beauty of their designs by the symmetry of the ciliated, winged and fringed ornamentations with which they are surrounded.



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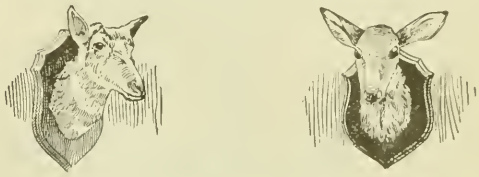

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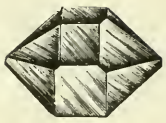

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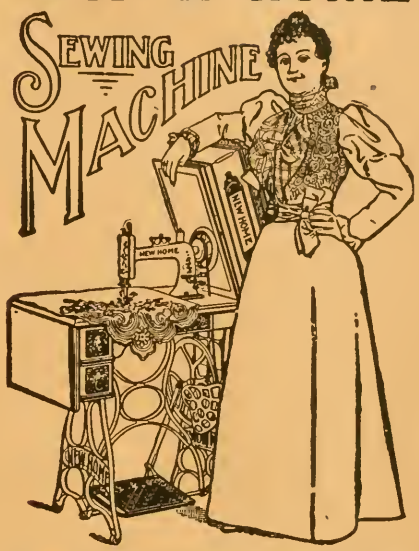

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